THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVIII. No. 1487.] LONDON, NOVEMBER 10, 1891. [43RD YEAR. Price 6d.

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The work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification
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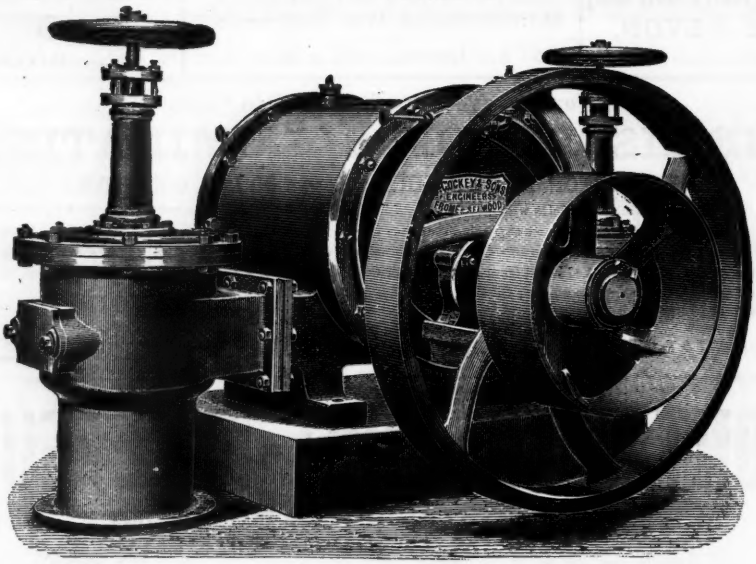

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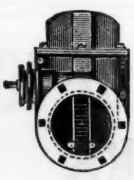

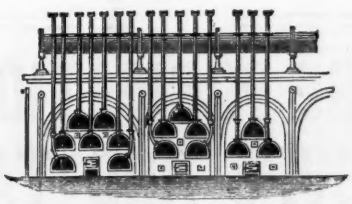

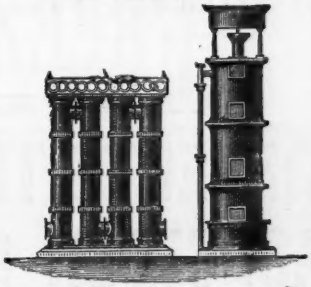

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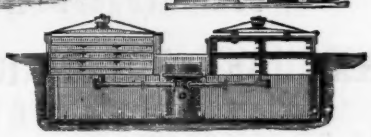

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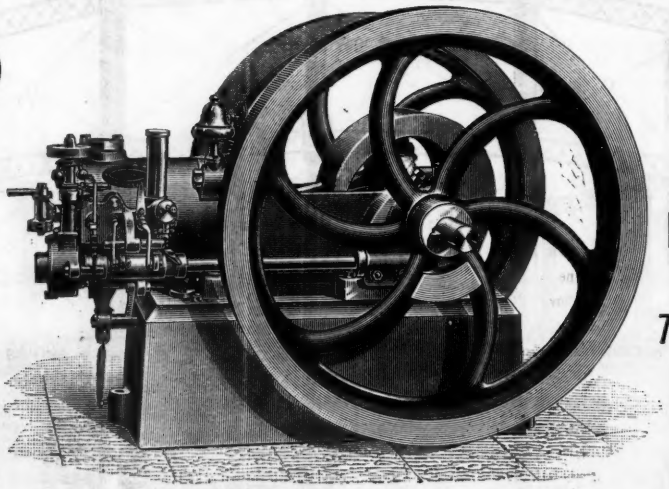

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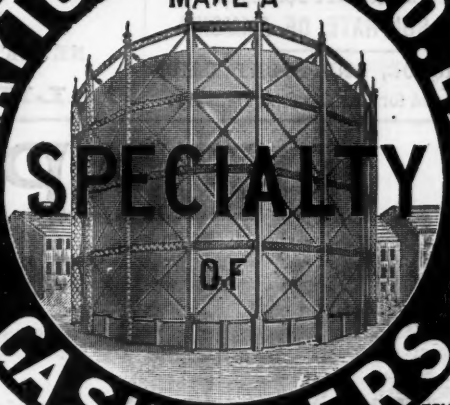

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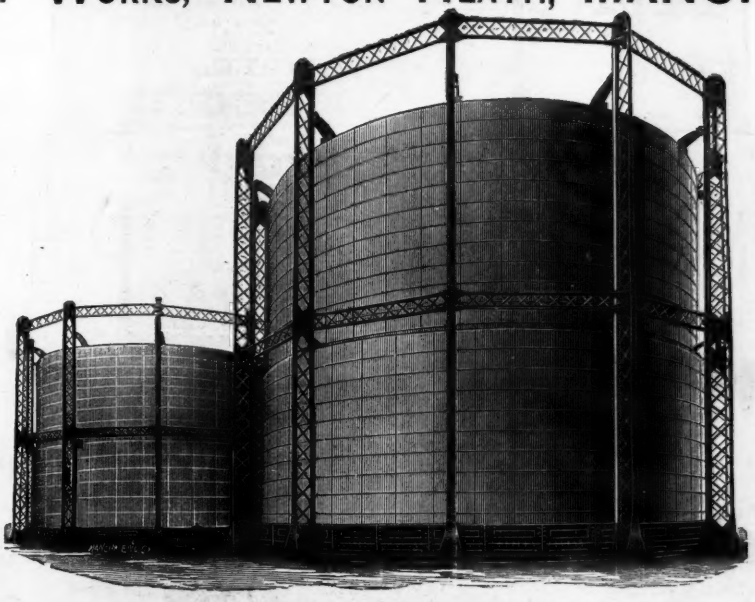

Illustration showing view of two Telescope Gasholders, each 65 feet diameter by 48 feet high, recently erected by Messrs. R. and J. Dempster, in Tanks previously occupied by Single-lift Holders 20 feet deep. The Tanks were made 4 feet deeper, by adding a Tier of Cast-Iron Plates, prepared with suitable Flanges, to meet the Brickwork of a Brick and Puddle Tank. The storeage capacity was thus increased nearly 150 per cent. at comparatively little outlay.

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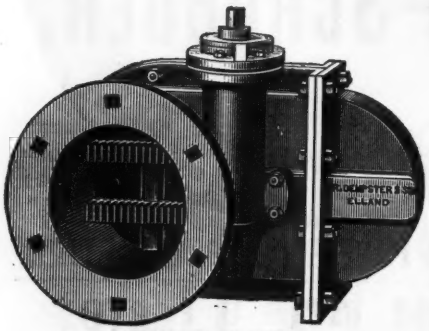
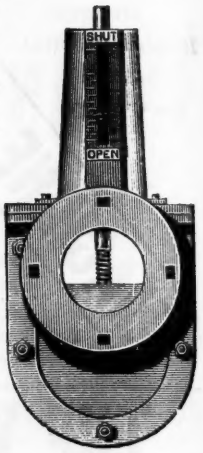


DOUBLE RACK VALVE.



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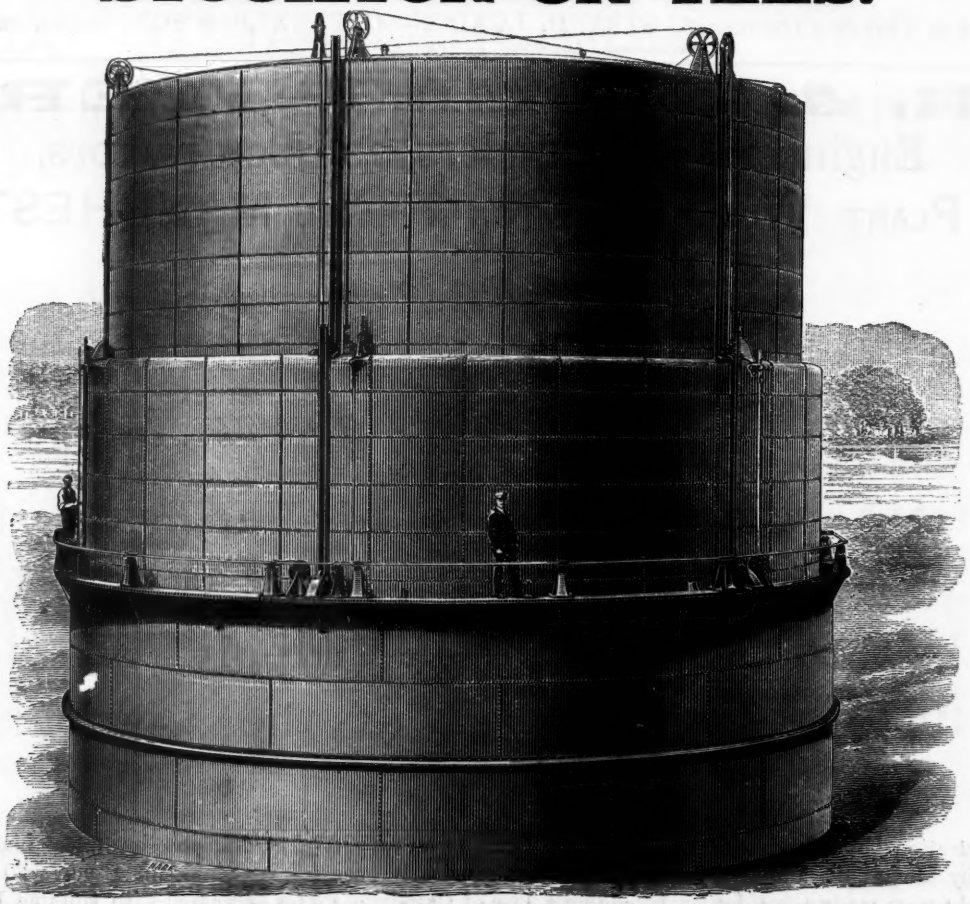
TWO-LIFT GASHOLDER, WITH TANK, WORKING WITH PEASE'S PATENT WIRE-ROPE SUPPORTS.
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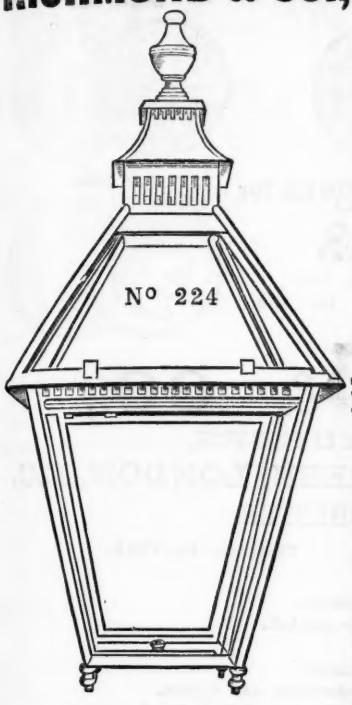

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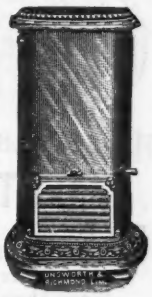

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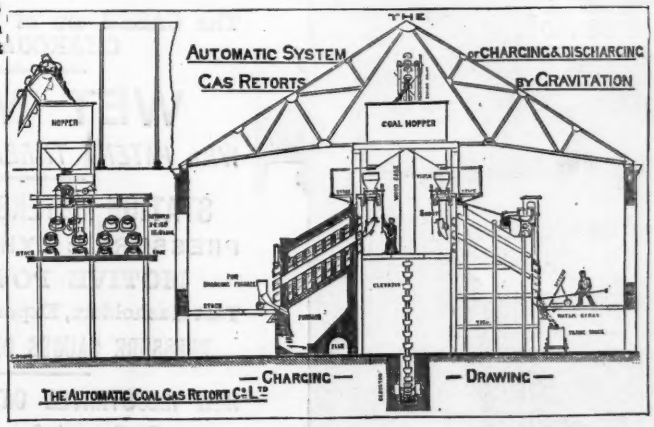

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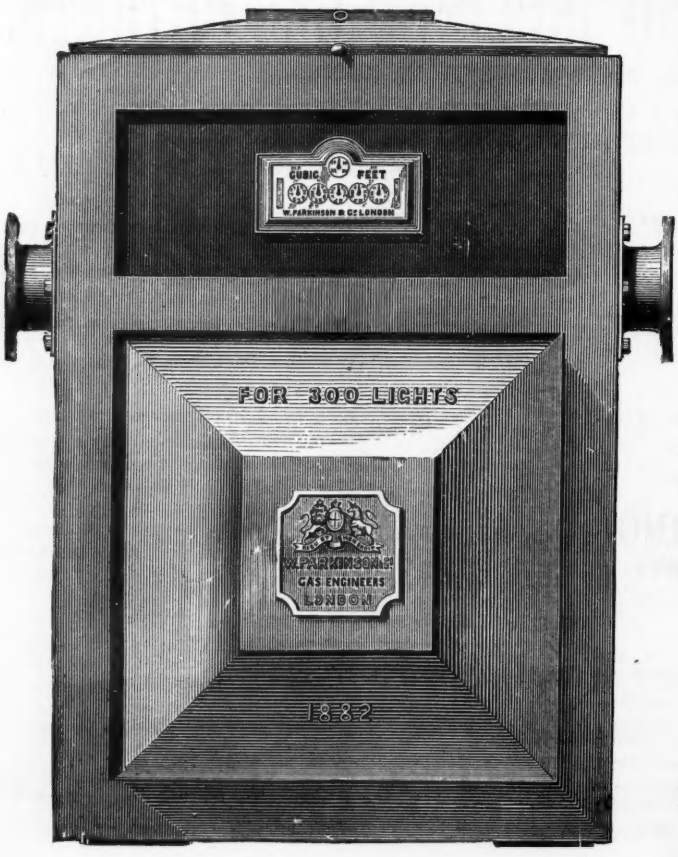

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 10, 1891.

Unionism and the Labour Commission.

Now we know all about it. The great National Union of Gas Workers and General Labourers is only a "side show" of the Home Rule party in politics, and of that particular section of the party which commends itself to the mind of Mr. Michael Davitt. This versatile gentleman "let the cat out of the bag" last week, in a speech at Cork, which was a most extraordinary farrago of blatant New Unionism, Socialism, and Political Faction. Do the Gas Workers flatter themselves that the politicians who take the trouble to exploit their organization for the sake of getting votes care one straw about the interests of Labour? If so, they will believe next that "Labour leaders" of the stamp of the gentleman whose name was mentioned in certain legal proceedings last week as habitually engaged in promoting sometimes companies and sometimes strikes, embark in these enterprises "for love." The Cork incident, moreover, serves to illustrate once more the truth that, in becoming a New Unionist, a labouring man is expected to surrender himself body and soul, with all that he has, to the dictation of the Union officials. Mr. Davitt was assured by the Cork gas workers that there were only a few "black sheep" among them. But to whom was this opprobrious designation intended to apply—to men without a clear card, to men who were weak upon the Eight-Hour question, or to men who were regarded as unsound in the matter of overtime? Not at all; it merely referred to such "free and independent voters" as had evinced a leaning towards one faction leader rather than another. This is Liberty, Equality, and Fraternity as New Unionists understand these "immortal principles." The only conclusion to be logically drawn from these evidences of the nature of the political side of the New Unionism is, that when he once enters into that state of servitude, a man dare no longer call his soul his own.

The Gas Workers' Union in England have plenty of work upon their hands just now; so that it is merely superfluous folly on the part of their leaders to convert themselves into political agents. The Labour Commissioners have resumed their sittings in Westminster; and although it is understood that none of the Gas Workers intends, if it can be avoided, to put himself in a position, as witness before the Commission, where awkward questions would be addressed to him, the methods of Trade Unionism are being gradually unfolded by the volunteer witnesses who from day to day relieve their minds on the subject for the edification of the Commissioners. Some very nasty statements have been made already as to certain newspapers being subsidized out of Union funds, and as to other questionable devices that have been put in operation in order to keep Unionism going and Union leaders in the saddle. It is not to be imagined that the proceedings of the Commissioners are unrelieved by a gleam of humour. On the contrary, some of the evidence they receive is distinctly funny, as when Mr. Clem Edwards innocently confessed that, although the only means of gaining their ends known to Trades Unionists is "moral suasion," he had heard of "*one* free "labourer" having been assaulted by a unionist in an "unofficial kind of way." These remarks are of the kind that contribute to the gaiety of nations.

A mass meeting was held on Clerkenwell Green last Sunday week, when a collection, which realized the grand total of 16s. 6d., was made towards defending an action for libel stated in the *Trade Unionist* as having been "entered by "Mr. Livesey against Ward," Assistant-Secretary of the Union. This is, of course, a misstatement. Mr. Livesey is not in the least likely to honour such a person as Ward by taking notice of any slanders he may utter against himself. We believe, however, that an action for slander has been commenced against Ward; but the plaintiff is a workman who is in the employ of the South Metropolitan Gas Company.

Is the Photometer a Measuring Instrument?

AT last there is a sign that the portentous action of the Standards Department of the Board of Trade, in requiring photometers used for the statutory testing of gas to be stamped as measuring instruments coming under the Weights and Measures Acts, has aroused some little interest in gas circles. In another column will be found a letter from a competent critic of the course taken by the Department, who maintains that Gas Companies are not bound to have their photometers verified and stamped. Our correspondent traverses the view of their legal responsibilities in the matter taken by the authorities of the Standards Department, and argues that a photometer is in no sense a measuring instrument used in the way of trade, and does not therefore come within the Act. We must confess that this is the view that has suggested itself to our lay mind; but, since the judgment of the House of Lords in the celebrated districting case, we have been very shy of assuming any-

thing as certain in regard to the sale of gas. Time was when we were in the habit of considering the consumer's meter as a delivering as well as a measuring instrument; but that belief has gone the way of all illusions, and left behind it a general feeling of uncertainty. So that when the Standards Department took the responsibility of declaring a photometer to be a measuring instrument under the Weights and Measures Acts, we were as loth to commit ourselves to the opposite view, as we should be if asked to state off-hand an opinion as to whether the occasional employment of carrier pigeons for the conveyance of letters might be construed into an indictable infringement of the monopoly of the Post Office. All the same, it certainly did appear that, while one lawyer might be able to bring his mind to the contemplation of the photometer as a measuring instrument, another could be found to argue with equal force that it is no more than an analytical apparatus. If a photometer is a trade measure within the meaning of the Weights and Measures Acts, where is the line to be drawn between the testing of quality and the measurement of quantity? Gas is sold by measure, and therefore the meter is an instrument of trade requiring verification and stamping as such. Very good. But, the Standards Department says, this commodity—gas—must be of a certain quality as tested by a particular instrument; *ergo*, this instrument is a measuring apparatus subject to the Act. Well, but when petroleum is sold for lighting purposes, it likewise is required to be of a definite quality; that is to say, it must possess a flashing-point of not lower than a stated number of degrees Fahrenheit. Is the instrument whereby this flashing point is determined also a measuring instrument? Again, a milkman sells milk in the ordinary way of his trade, and this milk must neither have been skimmed nor mixed with water. Are the analyst's instruments, by which this legal standard of quality is determined, subject to the jurisdiction of the Standards Department? We ask these questions in all sincerity, with the single desire for enlightenment, and not argumentatively for supporting the opposite view of this matter to that taken by the officers of the Department. The question is really pressing. There is every promise that the next outbreak of hostilities between the Corporation of Dublin and the Gas Company may be over this very point. It is not necessary for the present to discourse at length upon the way in which these natural, or unnatural, enemies could find themselves at loggerheads over a question of photometer stamping. It would be a more inexplicable thing, in the circumstances, if they could agree with regard to this or any other point of gas administration which happened also to be a point of contact between them. If the subject is to be taken into the Courts, it does not greatly matter who opens the campaign; but something should be done to settle the legality of the action of the Department.

Gaslight and Coke Finance.

The Financial Editor of the *Echo* has returned to the subject of the consolidation of The Gaslight and Coke Company's multitudinous capital issues, in an article appearing on Friday last, the purport of which was apparently to show that the operation described would result in a saving of £155,000 in the amount required to pay all the dividends and interest on the existing share and loan capital. We cannot follow this supplementary argument so easily as we could the previous statements; the difficulty of tracking the writer's jugglery with nominal rates of dividend and interest, market values, and revised prices of issue, being aggravated by the circumstance that he has shifted his point of view. Originally the reorganization of the Company's capital was advocated, through this singular medium for presenting the ideas of those who might be supposed to take the closest and liveliest interest in the affairs of the undertaking, purely as a means of rendering the unified issues more marketable. Then the scheme was supported on the ground that it would abolish the appearance of high dividends, which are supposed to frighten investors, and also to supply labour agitators with an argument against Gas Companies. Lastly, the financial reformer takes up new ground, and declares that he has "all along taken the "suppositious case that the London County Council are "the purchasers of the Company." But there was no mention of purchase by the County Council in the elaborate scheme for the consolidation of Gaslight and Coke stocks of which we took note in these columns last week merely because it was such a very cleverly-put and well worked-out idea. What has purchase or no purchase to do with a scheme of this kind? If the outcome of any such scheme of reorganization, supposing it to be carried into effect, would to be strengthen the position of the Company in any way, would not the County Council, if they entertain the possibility of ever having to purchase the undertaking, put a veto upon the project? To thus improve the property seems an odd way to prepare for the transfer of a gas undertaking to a local authority; and there is not the remotest chance of the London County Council being caught napping in this way. On the whole, therefore, we must confess that the *Echo* scheme for reorganizing the finances of The Gaslight and Coke Company, which began very well, tails off in a very feeble style, and is supported by an assortment of arguments too incongruous and mutually contradictory to be worth further consideration.

Two Shows.

The prominent citizens of Leicester have been enjoying a sort of "Mayor's Day" of a novel and interesting kind. If they had a Lord Mayor of Leicester, so that we could use such a grandiloquent prefix with reference to the municipal outing of which mention is made in another column, the significance of the comparison between these proceedings and the nonsensical parade that hindered business in the City of London yesterday would be more striking. As it happens, however, there is no Lord Mayor, and consequently no Lord Mayor's Day, in Leicester; but a very good modern substitute for the mediæval pageant of the City of London was arranged by Mr. S. Lennard, Chairman of the Gas Committee of the Leicester Corporation, who invited the members of the Town Council, the candidates for municipal honours, the chief officials of the Corporation, and other local notables, to a formal inspection of the Aylestone Road Gas-Works, concluding with a frugal entertainment in the reading-room attached to the works. The company were afterwards addressed by Mr. Lennard in an interesting and instructive speech, dealing with the meaning of what they had seen, and setting forth the interest which the Municipality of Leicester has in the prosperity of the local gas undertaking. It is not without reason that we have connected the two ideas of the Lord Mayor's Day in London and of the municipal outing in Leicester. The fundamental motive of both "functions" is, we take it, the same—namely, the exhibition of the power and glory of the Corporation and its belongings, in order that those who look on may obtain an exalted opinion of the municipal organization which can make such a showing. The difference between displays like that of Lord Mayor's Day in the London streets and Mr. Councillor Lennard's little party, is the difference between the past and the present. Londoners laugh a good deal at the obvious absurdities of Lord Mayor's Day, and grumble not a little at the interruption of their customary business and pleasure which they owe to this relic of antiquity. It would be a mistake to suppose, however, that the people of London, on the whole, object to the Lord Mayor's Show for itself, but only because, as a rule, the show is such a poor one, and furnishes such melancholy evidence that the gift of arranging street pageants has departed from the English people, who once enjoyed it in high perfection. Leicester, on the other hand, is our ideal of a well-administered, thriving town; and if there is at the present time a finer or a better-managed gas undertaking in England than that of which Mr. Alfred Colson is the head, we do not know where to find it. By all means let Leicester glory in its gas-works. All that is best and most truly representative in the local authority of a place like Leicester ought to look after these things, as matters which redound to its credit and welfare. The pageant of the Lord Mayor of London originated in times when it was highly desirable for the Court, and the feudal lords, and the commonalty, to be warned by the evidence of their eyes that the Chief Magistrate of the capital could command a state and a power second only to the Crown itself. Other ages have other needs. What is wanted now is evidence that English municipalities have glories of another kind than those associated with traditional men in armour, foresters, and watermen. We like to hear of a gas-works as one of

the show-places of a progressive town; and we hold that the more the facts of municipal enterprise are brought under the notice of the ratepayers, the less excuse will there be for those mischief-makers who are to be found in every place, whose delightful occupation it is to stir up strife between employers and employed, and who are never so truly happy as when on the track of some mare's-nest in the municipal affairs, with all the cheap local newspapers yelping at their heels.

The Meeting of the American Gaslight Association.

THE members of the American Gaslight Association have just held their annual meeting—the scene of the assembly being New York; and we gather, from the rather more than usually incoherent reports of the proceedings which fill the latest issues of our American technical contemporaries to hand, the general impression that the affair was particularly successful throughout. Very unfortunately, Mr. J. P. Harbison, of Hartford, Connecticut, the President of the Association, was too unwell to take the chair at the opening meeting. One of our contemporaries informs its readers that Mr. Harbison was "prostrated by the burning "torch of fever;" but we learn with pleasure that the deservedly popular President was able to appear later before the Association, which must have sadly missed him and the presidential address, which, in the circumstances, had to be dispensed with. The Secretary of the Association—Mr. C. J. Russell Humphreys—was unhappily in the same case with the President; and, consequently, the members had to attack their programme under the leadership of chief officers who could only claim an "acting" grade. The principal share of the official work fell upon Captain W. H. White, Vice-President of the Association (who has been elected President for the ensuing year), and Mr. A. C. Humphreys, the Acting Secretary. The Association has now provided itself with a new Secretary, in the person of Mr. A. B. Slater, jun. The Acting President delivered a topical speech from the chair; the peroration of which, according to the testimony of a deeply-impressed reporter, consisted of the "golden words," few in number, but very much to the point: "We have gone past the rule-"of-thumb time, gentlemen!" Truly, we will hope so. Several papers were submitted. One, by Mr. Charles H. Nettleton, was upon "Leakage," and contained the statement that the author has succeeded in reducing his loss under this head to 2·7 per cent. If this figure is intended to cover the whole of Mr. Nettleton's unaccounted-for gas, all that can be said is that he has "broken the record." Yet, upon further reflection, we seem to remember having heard of gas managers who have sold more gas, as per consumers' meters, than they made! Mr. Walton Clark read a paper advocating the charging of meter-rents, which does not strike one as a particularly novel or thrilling subject. Dr. Wilkinson had a paper recommending lime as a purifying agent, and counselling the re-burning of the spent material. Another professional gentleman, Dr. E. G. Love, read a paper on the illuminating power of mixed coal and water gas, which he appeared to regard as mutually improved by intimate association. Amiable and excellent gases! *O si sic omnes!* Other papers were read, and a quantity of miscellaneous business was transacted; including the passing of a vote of censure upon the Editor "of the independent gas journal of America," for having published reflections upon the conduct of the members of a Committee of the Association, which are regarded as being too "independent" of such old-fashioned considerations as justice and reason. It is infinitely refreshing to hear of Americans actually troubling themselves to proclaim the truth that the American newspaper press does not always fairly represent them. People are prone, now-a-days, to accept journalists at their own valuation, and to take it for granted that any pretentious little sheet, issued mainly in the interest of some advertisement contractor or ambitious trader, does really represent the character, interests, and views of the best men of the industry or of the class of the community to which its proprietor has elected to nominally attach it. How far this is from being the case does not require to be explained at length here; but it is good to see the truth illustrated occasionally. The fact that the American Gaslight Association has had a backbone stiff enough to protest against unwarranted journalistic detraction, is something upon which the members are to be congratulated. We only wish it were possible for the Association to go a step farther, and to procure the reporting of its doings in plain, straightforward English, to the exclusion of turgid "descriptive comments." As it is, every American technical journal seems to be bent upon trying to fill its columns with more rigmarole and with worse diction than its rivals. The American Gas Press is not inferior in these respects to other publications of a similar class appearing in the States; but this is not saying much. We desire to convey to the new President of the American Gaslight Association, and to the members generally, our felicitations upon the New York meeting, and our best wishes for the prosperity of the organization during the current year.

WATER AND SANITARY AFFAIRS.

As mentioned last week, the Corporation and the County Council have united their forces in order to bring the question of the Metropolitan Water Supply again before the notice of Parliament. The proposals which the Select Committee of last session refused to consider, when offered by the Corporation and the County Council as amendments to the London Water Commission Bill, are now to be embodied in a distinct measure, designated "the agreed "Bill." The Corporation have, in this instance, been obviously overshadowed by the younger body. The scheme of legislation sketched in the first report presented to the Court of Common Council by the County Purposes Committee, was based on the report of the Select Committee in respect to the matter of purchase. Mr. Rose-Innes declared that, without such a purchase clause as was then proposed, "the water question was insolvable." Yet, at the very next meeting of the Common Council, the County Purposes Committee presented a report, proposing a Bill which should leave the purchase of the Water Companies' undertakings perfectly optional; whereas, on the former occasion, it was proposed that purchase should be compulsory at the end of four years. Mr. Rose-Innes, who moved the adoption of the first report, moved the adoption of the second; and the resolution was carried. At the first meeting, it was stated that the County Council would not agree to a purchase clause; and before the adjourned meeting was held, a conference between a deputation from the Council and one from the Corporation led to the framing of the second report, recommending an essential change in the Bill. It is to be observed that the Bill which is to be introduced is only an enabling measure; whereby the Statutory Committee to be formed will have power to promote Bills. A scheme of supply is not yet launched—unless it be the "City well;" and purchase remains in the clouds. In the meantime, the County Council have received a reply from Lord Salisbury, stating that the subject of the water supply is receiving the "very careful attention" of the Government.

Major-General A. de C. Scott's report on the Metropolitan Water Supply, in the Appendix to the Annual Report just issued by the Local Government Board, is of considerable extent, but in many parts is only a repetition of what has been included before. A leading argument is that the Thames, but more especially the Lea, is insufficient for the supply of London during seasons of drought. The average daily flow of the Thames is so large, that the quantity taken from it by the Companies becomes only a small fraction of what the river yields; and during floods the flow is overwhelming. But it is contended that the strain on the river is severe during periods of drought, when the flow is least, and the demand for water is at its maximum. Figures are given to show that, in September last year, very nearly 25 per cent. of the river was abstracted daily. Concerning the Lea, the case is alleged to be worse. Mr. Beardmore's gaugings, taken in the years 1850 to 1868, are cited to prove that the volume of the Lea, during four months in dry years, is under 46 million gallons per day. As the daily supply required in the districts served by the New River and East London Companies sometimes reaches 81 million gallons per day, towards which only 10 million gallons may be taken from the Thames in addition to that obtained from the Lea, a considerable balance has to be drawn from the deep wells and the storeage reservoirs. But we would observe that hitherto the supply has not failed; and the Companies must be too well aware of their responsibilities to run the risk of ceasing to fulfil their statutory obligations. Concerning the resources yet to be drawn

upon, whether in the basin of the Lea or the Thames, General Scott speaks doubtfully. "A very important "contribution to the water supply of the Metropolis could "be made from the store of subterranean water collecting "annually in the chalk and oolites in the upper basin of "the Thames;" but we are told it is improbable that the entire quantity could be obtained from wells and tunnels "at any reasonable cost," especially as compensation reservoirs would be a necessary adjunct.

We cannot see in General Scott's report any reason why an important supplementary supply should not be obtained in the Thames and the Lea valleys. There are the chalk wells, together with the underground water in the gravel beds; and the water that may be intercepted as it filters towards the Thames through the chalk. Neither can we consider compensation reservoirs impracticable. On the supply to be obtained from the chalk, General Scott signifies that a thorough investigation is urgently required, and is a matter of the highest importance. It may therefore be too soon to express a decided opinion upon the subject. On the other hand, it is possible that the Companies have already investigated the matter for themselves. But after we have got over the question of quantity, there comes the argument as to quality. Here we would appeal to the analyses recorded by Dr. Frankland and others, showing that organic contamination in the supply has been much lower lately than it was formerly. So also in his examinations for turbidity, Dr. Frankland speaks of "the enormous improvement which the Water Companies "have effected in filtration" since 1868. General Scott nevertheless points to the state of the towns and villages bordering the main rivers and their tributaries, and speaks of "doubt and anxiety" as affecting the minds of those who are cognizant of the conditions affecting the supply. Yet experience seems to show that the unfavourable conditions may be counteracted by the engineering skill at the disposal of the Companies, coupled with due vigilance on the part of the sanitary authorities.

At the half-yearly meeting of the West Middlesex Water Company, held last week, the Chairman, Sir W. H. Wyatt, in addressing the shareholders, called attention to the nugatory and expensive character of the inquiry conducted in the last session of Parliament by Sir M. W. Ridley's Select Committee. On the side of the Companies, there was necessarily all the expense and trouble proper to a regular parliamentary campaign. Yet the result was that the Companies were never called upon to produce a single witness; and the Committee told them that they had never been attacked. The whole affair was a species of sham fight, for which nevertheless a heavy bill had to be paid. There is now an intimation that the real fight is to come off next year; and no doubt there will be some kind of demonstration, involving the Companies in fresh expenditure and encroaching once more on the time which Directors and officials are supposed to devote to their ordinary duties. The expense to the West Middlesex Company has exceeded £3000; and other Companies must have suffered in a similar degree. One of our morning contemporaries blames the Water Companies for spending money in obstructing "the loudly expressed wishes of the popula- "tion of London in regard to the water supply." But the Companies simply stood prepared to oppose certain Bills which the Select Committee in their wisdom rejected. So far the Committee and the Companies were in agreement; and it remains to be proved whether one or other of the Bills really accorded with "the wishes of the "population." Another point in Sir W. H. Wyatt's address consisted in his reference to the policy of the Directors in providing new works, as if no agitation existed for a transfer of the supply, or for superseding the Companies. This helps to meet the charge which has been made, that the Companies have been neglecting their plant and machinery in order to pay good dividends, and so claim the heavier compensation. With all their outlay, we are glad to find the shareholders in the West Middlesex Company still receiving their 10 per cent.; and the consumers enjoying a liberal rebate, coupled with the rapid extension of the constant supply throughout the entire district. The approaching retirement of the Secretary (Mr. G. B. Hall) is an event to be noted; and though we should have been glad if this could have been averted, it cannot be denied that rest has been well earned by him, after nearly half a century spent in the Company's service.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 865.)

THE past week has been a very depressed time on the Stock Exchange. At the re-opening on Tuesday, the tone was dull; and it became worse as time wore on, with scarcely a break of momentary recovery, and it closed without any improvement. The cause of the depression was in the Foreign Market, which exhibited centres of weakness upon all sides and in both hemispheres. Affairs, both political and financial, in Paris and Berlin, in Russia and Brazil, depressed the market heavily; and other descriptions fell in sympathy. The general uneasiness and apprehension had the effect of checking operations materially. The Money Market meanwhile remains very quiet; and the demand is easy. Business in the Gas Market was fair in the earlier portion of the week; but it tailed away later on to very small proportions. Several changes of quotation have been effected, especially in the leading issues; and, on balance, the alterations are mostly downward. At the same time, it is not probable that much stock has actually changed hands at the lower figures. Gaslight "A" opened with a mark of 221; but at the close of the day, the figure was 2 lower. On Thursday, a bargain at 216 was recorded; but subsequent figures were better. On the whole, the quotation fell 2. Most of the secured and limited issues were dealt in; but prices were only very moderate, except for the debenture stock. A little business was done in South Metropolitans at better figures—the "A" showing an advance of 5; and the "B," 2½. A couple of transactions in the new stock at about middle figures was all that was done in Commercials. In fact, so far as we are aware, Metropolitan stock generally has been scarce; and the scare was not successful in causing much to be thrown on to the market. Nothing Suburban or Provincial made any move, except Bristol, which fell 2. The Continentals were depressed; and quotations were mostly lower. Of the Indian group, Bombay fell ¼; but the Oriental Company appear, from their accounts, to have done well during the last twelvemonth. South Americans are down; Monte Video and San Paulo receding ½ each. The Water Companies showed a tendency to weakness all round; but only one or two quotations have given way.

The daily operations were: Moderate business on Tuesday was the rule, with an easier tendency. Gaslight "A" fell 1; and San Paulo, ¼. Business was quieter on Wednesday; and prices underwent no alteration. On Thursday, there was more activity; and movements were irregular. South Metropolitan "A" improved 5; and ditto "B," 2½. But Gaslight "A" and Imperial Continental fell 1 each; Continental Union, 5; and Monte Video, ½. Lambeth Water was 1 lower. Friday was quieter and more steady; the only move in gas being a fall of ¼ in Bombay. Kent Water fell 5. Saturday's prices also were generally fair. Bristol receded 2; but everything else was steady.

ELECTRIC LIGHTING MEMORANDA.

Sir David Salomons on the Cost of Electric and Gas Lighting—A German Book on Electrical Supply—Trolley-Wire Electric Tram Cars; a Rumoured New Edison Invention.

AN extraordinary general meeting of the City of London Electric Lighting Company, Limited, was held on Thursday last—Sir David Salomons in the chair. The business was in the main formal; consisting of the passing of a resolution confirming an alteration of one of the Company's Articles of Association which had been voted at the recent ordinary general meeting. After this resolution was passed, however, the Chairman took the opportunity of making a speech in answer to an assertion, which he said he had seen "in certain newspapers," that he had, in his address to the shareholders at the ordinary general meeting, conveyed an entirely erroneous impression as to the relative cost of gas and of electricity. He went into this matter at some length, and finally declared that the cost of electric lighting equivalent to gas lighting in amount lies between gas at 4s. 6d. and 4s. 11¾d. per 1000 cubic feet, with electricity at 8d. per unit. Since it was the JOURNAL that ventured to call in question the optimistic estimate which Sir David Salomons laid before the Company on the occasion referred to, we are constrained to return to the charge, and repeat the assertion that in this matter Sir David is misleading those who are disposed to believe in him. We are not in the least overawed by the fictitious exactitude imparted to the estimate in question by its farthings. We can quite understand that, like the scrupulous hero of the well-known fish story, Sir David Salomons will not bring himself to tell a falsehood for the sake of a farthing, or else it might have been thought that he could have made the price of gas 5s. per 1000 cubic feet while he was about it. We will, however, give him the farthing in, and repeat that all consumers of electricity who expect the cost of this commodity to work out to less than as many shillings per 1000 cubic feet for the price of equivalent gas lighting as there are pence in the price of the Board of Trade unit supplied to them, will be sadly disappointed when they see their bills. For confirmation of this statement, we can refer to the Editor of *Truth*, who has an independent consumer's experience on the point.

We have received a well got-up volume comprising a number of interesting and valuable reports which were originally submitted to the Conference of German Town Administrators assembled in connection with the Frankfort Electrical Exhibition. Although the exhibition itself was international only in name, it was the occasion of the assembly of several congresses, to one at least of which the high-sounding description of international might be rightly applied. Others were of a more localized type; and of these the meeting of the German Municipal Authorities was one of the most important in the estimation of the exhibiting firms, who saw in these administrative chiefs of towns throughout the Fatherland a number of prospective patrons whose goodwill it was highly desirable to secure. Consequently, Herr Ingénieur Uppenborn was commissioned to put together a volume containing all the information that could be gathered, in connection with the Frankfort Exhibition, upon the supply of towns with electricity; and we have the result before us. The work has been well done; and the promptness with which the book has appeared is deserving of all praise. Anybody who wishes to know the present condition of the industry of electrical supply in Central Europe cannot do better than send to the publishers (Julius Springer, of Berlin, and R. Oldenbourg, of Munich) for a copy. We wish to draw special attention to the report upon the Dessau Central Station of the German Continental Gas Company, in which gas-engines are employed. The report is very full and clear, and is illustrated with plans of the generating station for 1886 and 1891. We have frequently expressed our views upon the attitude of gas companies towards electric lighting. If there is to be any connection between the two classes of undertakings, it should be through the gas-engine, as in this case.

It is a curious coincidence that almost on the same day that we published our remarks upon the failure of above-ground electrical traction to take the place expected of it as a profitable branch of electro-technics, there should have been inaugurated at Leeds the first experiment upon British soil with the "trolley-wire" system of electrical tram-car propulsion, which has so many working illustrations in the United States. This system explains itself by its name. It is the generic title for several patterns of electrically-driven road-cars, in which the supply of current is laid on by means of overhead wires operated parallel to the track, whence a running connection and a branch wire convey it to the motor carried by the car. The overhead wires and the running connection are, of course, a great nuisance; but one nuisance more or less does not appear to amount to much in the estimation of the inhabitants of United States towns. In the case of the suburb of Leeds wherein the present experiment is being tried, it is expressly conceded that it is a neighbourhood which cannot be spoilt, and that any means of facilitating street traffic which offers a speedy transit through the quarter for any person who may be condemned by Fate and circumstances to traverse it on business, is not to be despised on the score of appearances. Subject to this concession, the trolley-wire is reported to answer pretty well in Leeds; but its introduction to any self-respecting locality is obviously impossible. Yet we are told that this is the only system of electrical road-car propulsion that has any claim to commercial success. It is reported, however, that even in the United States the trolley-wire cars are regarded as makeshifts. The older and better administered cities will not have them; and the electricians of the whole Continent are racking their brains and depleting their supporters' purses in an endeavour to produce a self-contained electrical tram-car. The accumulator system is practically given up as hopeless. It never made much headway in the States; and even here secondary batteries as aids to locomotion are only credited with a *succès d'estime* in respect of the electric launches on the Thames and on Lake Windermere. Mr. Edison is rumoured to have something very good in the background in connection with this matter; but unless he makes a great deal more of his electro-motor, if he has one, than he did of his last production, the phonograph, people will begin to think that prosperity has got the better of one of the most eminent of living Americans, and that his age of productiveness is past.

Mr. J. H. Silcox, the Manager of the Pembroke Gas Works, has been re-elected to his seat on the Town Council.

Masonic.—Bro. John H. Penney, the Secretary of the South Shields Gas Company, has just passed through the chair of the Hadrian Lodge, No. 1970, and last Tuesday installed his successor, Bro. G. Harland.

The Wenham Lamp Patent.—Our readers may remember that after the delivery by Mr. Justice Vaughan Williams of the judgment in the action brought by the Wenham Company, Limited, against the Champion Lamp Company, in May last, for an alleged infringement of their patent (see JOURNAL, Vol. LVII., pp. 901, 968), it was intimated that the defendants intended to appeal. The matter came last Friday before Lords Justices Lindley, Bowen, and Kay, when the appellants' case was supported by Mr. Morton Daniel and Mr. Jenkins; the Attorney-General (Sir R. E. Webster, Q.C., M.P.), Mr. Aston, Q.C., Mr. F. Moulton, Q.C., and Mr. Lawson representing the respondents. The hearing occupied the Court till Saturday morning, when the appeal was dismissed with costs. Our report of the case is unavoidably held over till next week.

THE DUTY OF GAS-BURNERS.

THE question of the illuminating efficiency of artificial light-sources is one that has only been raised during the last few years; but it has already attracted much attention, and has gathered round itself a good deal of interesting literature. Expressed in another way, the same question has been studied by several prominent men of science, under the name of the mechanical equivalent of light. By these terms is meant the problem of the ratio which the luminous radiations of a light-source bear to the invisible heat-rays, and which both together bear to the total amount of energy that goes to the maintenance of the phenomenon of visible and sensible dissipation of light and heat exhibited by the light-source during a given period of time. The problem may be more easily understood by illustrating it with reference to the possibilities of treatment applicable to a ton of coal. Here we have a portable store of potential energy which can be utilized in a variety of ways for affording us a supply of light, heat, or electricity, and for developing motive power. Practically, all mechanical engineering is concerned in exploiting the typical ton of coal to the best advantage. We cannot possibly catalogue—to say nothing about discussing—the applications of coal whereby most weight can be moved by it, or the highest rate of locomotion attained by its aid, or the greatest amount of heating effect developed by its combustion. For the present we must assume that the coal has been worked over into the various products of carbonization as usually carried out in gas-works; and we shall confine ourselves here to a brief discussion of the economy of light-production by the gas which results from this process.

Electricians may exclaim that this assumption is wrong if our object is to use up the typical ton of coal in obtaining the greatest amount of light which this fuel is capable of giving. They will tell us that it is more economical to burn the coal under a boiler for the purpose of raising steam to drive an engine, the power of which may be converted into electricity by means of a dynamo; and that this electricity will give more light through the agency of an arc lamp than can be obtained from the same consumption of fuel in any other way. On the other hand, it is not only gas engineers who contend that to burn coal in a furnace is a barbarous proceeding, only to be permitted under protest, or for the purpose of steam navigation. On land, and wherever it is a question of getting the utmost value out of the coal, it is generally agreed that some system of carbonization which permits of the recovery of those of its constituents which are wasted by open furnaces is a prime necessity of truly economic working. If coal is to be carbonized at all, there is no reason why it should not be done thoroughly, as in gas-works. There is no economy in half measures; and the coke which the gas manufacturer has to sell, and which may be conveniently used in generating steam for electric light engines, is a fuel open to much less objection than raw coal. But, says the electrician again, even the gas which is supposed to be reserved for lighting may be more economically employed for this purpose if applied to the generation of power in a gas-engine for driving a dynamo, than if burnt direct in lamps. In fact, from the electrician's point of view, the worst possible use to which coal gas can be put is to burn it for the direct production of light.

Regarded from the standpoint of the economist, the application of a typical ton of coal for the direct raising of steam compares as follows with its treatment even with the same end—the production of power—by carbonization: The gas manufacturer is able to sell from his ton of raw material (say) 10,000 cubic feet of gas and 1200 lbs. of coke, besides (say) 112 lbs. of tar. All these are combustible products. He has likewise a quantity of ammonia and some sulphur, as to which it need only be said that, although they are of no value as combustibles, they are better in his stores than they would be in the atmosphere, where the steam engineer would put them. From the combustible products might be developed as follows: From 10,000 cubic feet of gas, by engines taking 25 cubic feet per horse power, 400-horse power; from 1200 lbs. of coke, burnt in a boiler at the rate of 9 lbs. per horse power, 133-horse power; from 112 lbs. of tar, burnt in a boiler at the rate of 2 lbs. per horse power, 56-horse power—total, 589-horse power.

It would, therefore, be necessary for a steam plant burning the coal direct to develop a horse power for a consumption of $2240 \div 589 = 3{\cdot}8$ lbs. of fuel to show as good a result. Of course, this comparison does not take account of the money consideration, but is merely put forward to show that carbonization is in the scientific sense an economical way of treating coal, even where power production only is aimed at.

This is but one way of regarding the application of coal for illuminating purposes. There is a more recondite form of the question, which takes us up to the economical consideration of gas as actually burnt for the purpose of lighting. What is the effective lighting duty of a gas-burner? How much of the total radiation from the burning gas is light, and how much is invisible heat? This is obviously a very practical, as well as a very philosophical query; for upon the completeness of the answer that can be found for it depends the possibility of our being able to measure the useful performance of a burner, as distinguished from the gas consumed in it. The latest experimenter who has attempted to grapple with this problem is Sir John Conroy, who has published an account of his

work in the Proceedings of the Royal Society. Sir John Conroy imagined a method of filtering out the light rays from the total radiations of an Argand gas-burner, to be worked in connection with a thermopile and a galvanometer. Essentially, his apparatus consisted of a glass trough with parallel sides, containing water, which was placed in the path of the rays of light. The rays that passed through this screen were received upon a sensitive thermopile, which was connected in a circuit with a battery and a reflecting galvanometer. When any heat fell upon the thermopile from this source, it showed that all of this class of radiations were not stopped by the water-trough, which was increased in thickness accordingly. Sir John Conroy found that 3 millimetres of glass and 10 centimetres of water did not stop the whole of the non-luminous rays from an Argand gas-burner; but when the thickness of the water was increased to 15 centimetres, the transmitted radiation consisted exclusively (or nearly so) of those kinds of radiation which affect the eye as light. Tested in this way, the total radiation from an Argand gas-burner was found by Sir John Conroy to be composed of about 1·75 per cent. of luminous and 98·25 per cent. of non-luminous rays. It is placed upon record in the same memorandum that Herr O. Tumlirz has stated before the Vienna Academy that the light-efficiency of the Hefner-Alteneck amyl-acetate lamp is 2·4 per cent. A thermopile and a galvanometer were used in this determination also. Sir John Conroy tried an alum solution at first in his heat-arresting screen; but he found that there was no advantage to be obtained by its use in comparison with pure water.

A great deal of Sir John Conroy's voluminous memorandum upon this subject is devoted to remarks upon the electrical measurements, and to other aspects of the experiments not specifically related to the question of the duty of the gas-burner. This is, however, the sole point that we care to dwell upon; and we do so with mingled feelings. It seems monstrous that in a gas-burner of the highest class, by which gas is consumed on purpose for its light-giving quality, and for no other, only 1·75 per cent. of the total radiation should be of any use in this regard, while all the rest is worse than wasted. We do want light, and we do not want heat—at any rate, from a lighting burner; and this is the duty we obtain! It has always been considered as a heavy reproach to mechanical engineering that the best steam-plant only gives a useful duty of about 10 per cent. of the theoretical capabilities of the fuel burnt in the boiler furnace. The gas-engine improves upon this; for it develops at least 25 per cent. of the total energy contained in the gas which it consumes. But what can be said for the Argand burner, after Sir John Conroy's revelations? It is to be feared that we must rate all our most highly-esteemed gas-burners as "unprofitable servants."

It would be a pity for the simple kind of experiment marked out by this amazing report to be neglected by those who have the greatest interest in the development of the lighting power of gas. Sir John Conroy has told us that a simple glass trough, 15 centimetres through, will stop all the heat-radiations of gas-flames of the Argand type. It would appear that in this information lies the germ of something like an exact instrument for the comparison, not of gas, but of burners. It has been argued, for instance, that the amount of the improvement of lighting effect due to the more modern types of recuperative lamps is more apparent than real; and the statement has been made that, if the total spherical effect produced by such lamps is taken into consideration, their increased efficiency as compared with open-chimney burners will only amount to 25 per cent. at the most. Now here, as it seems, is a way of settling this and other questions respecting the effective duty of gas-burners of every type. Their lighting effect must be referable to the proportion of rays which they can send through a screen transparent to light, but capable of arresting heat radiations. Of course, it is to be supposed that the perviousness of any screen of the kind depends to some extent upon the intensity of the radiation with which it has to deal; so that a water-screen which would effectually stop all the heat-rays from an Argand burner consuming 5 cubic feet of gas per hour would not be thick enough for a large recuperative lamp.

Another curious reflection which this statement suggests, is with reference to the connection between brightness of light and economy of consumption. It is known that (in the case of Argand burners, at any rate) the highest illuminating power is not an attribute of the whitest flame. Yet whiteness is a popular desideratum in a lamp; and recuperative lamp flames are very much whiter than the flame of the standard Argand. On the other hand, we are told that the luminous duty of an amyl-acetate lamp is much superior to that of gas in an Argand; yet the light of this class of lamp is notoriously dull in colour. It would be interesting to know how different kinds of oil-lamps, and candles, together with the light of pentane, compare with gas-burners as tested by Sir John Conroy's method. Indeed, it is evident that a good deal of instructive work in the comparison of incandescent with flame lights, &c., might be done with the addition of a 15-centimetre water-screen to an ordinary photometer. For the testing of the heat-arresting powers of screens of different thicknesses, the thermopile method would have to be employed. But this is nothing very alarming; and in any case it is to be hoped that Sir John Conroy's results will be ttested by independent experimenters.

We are brought back irresistibly, however, from thinking of these tests, to the one salient fact which they convey—that an Argand gas-burner wastes 98·25 per cent. of the gas it consumes, so far as lighting effect goes. The gas cannot be burned without heat, of course; and this heat must radiate from the centre where it is generated. But must the difference between heating and lighting effect be so immense? What a vast gain in luminosity would necessarily follow any successful attempt to convert but a fractional percentage of those non-luminous heat-radiations into visible light! We burn our gas and obtain a spendthrift's return of less than 2 per cent. of useful effect from it; whereas the glow-worm and the fire-fly almost reverse the proportions, and possess the secret of burning their fuel, whatever it is, in a brilliant but cold flame. Let no one say after this that there is nothing to be discovered in the field of gas lighting. Our gas-burner and lamp makers are the veriest bunglers still beside the "night-shining worm" whose economical management of his private lighting installation arouses more wonder as we are brought to understand the imperfection of our own art. We may never attain to this high standard of Nature's illumination; but it ought not to be too much to hope for a little redress of the tremendous discrepancy between this pattern and our common practice.

Mr. A. G. Browning has resigned his appointment as Manager of the Llanelly Gas-Works, and Mr. Vivian has been appointed in his stead.

Death of Mr. D. Laidlaw.—The announcement of the death, in his 83rd year, of Mr. David Laidlaw, of the firm of Messrs. R. Laidlaw and Son, of Glasgow, Edinburgh, and London, which took place on the 1st inst., will be received with regre by many of our readers. The firm had its origin in Edinburgh, where it still has a branch in Simon Square; but the late Mr. David Laidlaw extended its operations to Glasgow, and by his talents developed the business to its present dimensions. His engagements were so pressing that he could not take a prominent part in political or municipal affairs; but he willingly helped with his means every good cause brought under his notice. To his church, which was the United Presbyterian, he was a constant benefactor; and by his kindly disposition and genial manners, he endeared himself to a large circle of friends. Latterly he had relinquished the active duties of the business in favour of his son, whom, with two daughters, he leaves behind him.

Books Received.—We have received from Messrs. Whittaker and Co., of White Hart Street, E.C., "The Alkali Makers' Handbook," by Drs. Lunge and Hurter. It is the second edition of the work, which has been enlarged and thoroughly revised. As it contains a valuable collection of tables and analytical methods for manufacturers of sulphuric acid, nitric acid, soda, potash, and ammonia, it will be found useful as a companion to the larger book by the first-named author which was reviewed in the JOURNAL a fortnight ago. The "Handbook" is one of the "Specialists' Series," several of which have been noticed from time to time in our columns. The same publishers have also forwarded "The Practical Telephone Handbook," by Mr. J. Poole; and "A First Book of Electricity and Magnetism," by Mr. W. Perren Maycock, M. Inst. C. E. We have to acknowledge the receipt of the interesting volume of "Vital, Social, and Economic Statistics of the City of Glasgow for the years 1885 to 1891," compiled by Mr. J. Nicol, Chamberlain of Glasgow, and published by Messrs. J. Maclehose and Sons, of that city. Mr. Nichol's work was noticed by our Glasgow correspondent last week. Among the pamphlets which have lately come to hand are "Notes on the Transmission of Power," by Mr. L. A. Steavenson; "Drainage and Irrigation of Land in their Relations to Health," by Mr. R. F. Grantham, M. Inst. C. E.; and "The Public Health (London) Act, 1891," a concise abstract of the clauses of the Act, with index.

Ice-Making with Gas.—In the JOURNAL for the 6th ult. reference was made to the reported discovery of a process by Mr. F. P. Sticker, of Buffalo (N.Y.), for making ice with gas, and returning the latter unimpaired to the mains. According to the *Progressive Age*, the experiments are not yet completed; and consequently a detailed account of the process cannot be given. As already mentioned, an experimental plant has been erected at the Provincial Gas Company's works at International Bridge (Ont.); and the trials are being industriously carried on. It consists solely of a small vertical steam-engine of ordinary make, and a tank of brine, in which is located a coil of gas-pipe. The natural gas is brought from a well eight miles distant, where it shows a pressure of 500 lbs.; but by the time it reaches the engine it is reduced to 170 lbs. The pressure, when applied in the steam-chest of the engine, acts precisely as steam, and generates immediate and extraordinary power. The effect of this upon the gas is to rob it of all heat, and reduce the temperature. Soon after the engine begins to work, the pipes from the steam chest, and a portion of the chest itself, are coated with frost. The exhaust gas passes through the coil in the tank, reduced from 60° above zero in the full pipe, to 80° below in the exhaust. In the tank of brine are immersed several galvanized iron moulds about 14in. by 28in., and 4in. thick, filled with pure water. A period of about 10 hours suffices to freeze these solid. The gas is not injured, burned, or wasted in the process, and so it passes back into the main retaining all its heating and illuminating properties.

NOTES.

Test of a Lancashire Boiler.

In the course of their systematic steam-boiler experiments, Mr. Bryan Donkin, jun., and Professor Kennedy, F.R.S., tested one of the Lancashire boilers at the Bankside works of the London Hydraulic Power Company, by the permission and with the assistance of the Engineers of the Company, Messrs. Ellington and Corbet Woodall. The boiler tested was of steel, 28 ft. long by 7 ft. 6 in. diameter, with two 3-feet tubes, each containing four Galloway tubes. Before the experiments, it was thoroughly cleaned. A Green's economizer, with 96 tubes, was used with it; and it was fired by a Vicar's mechanical stoker, which supplied fuel continuously, without any opening of the fire-doors. It was worked somewhat hard; but it burnt its coal well, without smoke. The test lasted for nine hours, during which 3017 lbs. of coal were burnt. The furnace gases, after passing the economizer, were at a temperature of 372° Fahr. at the base of the chimney. The evaporative duty was after the rate of 13·12 lbs. of water per pound of coal pure and dry, from and at 212° Fahr. The balance-sheet of the boiler, including the economizer, was as follows: Heating and evaporating water accounted for, 81·5 per cent. of the available heat; the heating of the furnace gases took 19·3 per cent.; and radiation, 7·2 per cent. The economizer played a conspicuous part in the economy of the arrangement. There were two experiments, which practically corroborated each other. The figures given here relate to the first. At the same time as the boiler experiments, tests were made of the compound pumping-engines, with a view to determine the value of the steam-jackets. The best result with jackets was 20¼ lbs. of steam per indicated horse power per hour.

Domestic Smoke-Exhausting Apparatus.

Reference was made at the recent Congress of Hygiene and Demography to an apparatus devised by Dr. Sheridan Delépine and Mr. Gomess, for the filtration of yellow smoke, which was designed with the ambitious object of preventing yellow fogs. The apparatus was exhibited in model before the Congress; and it appeared to work well, so far as the scale of the experiment allowed. The idea is to connect house chimneys with the town sewers, through a suitable hydraulic seal-box, which is to prevent any regurgitation of sewer gases when the apparatus is not at work. A number of water-jet pumps or exhausters are connected with the flue in such a way that a large amount of air can be displaced, under low pressure, by a small quantity of water. The so-called water-pumps employed in this system have been specially devised for the purpose by Dr. Delépine, and depend upon the principle of intermittent syphons. The construction of the pump is such that a fall of only a few inches of water is sufficient to ensure a removal of the smoke-laden atmosphere; and the authors of the device claim—in response to the obvious objection relative to the quantity of water required for working such a system—that the same water can be used over again provided the difference in level between one set of pumps and another is at the least 4 or 5 feet. It is further suggested that, owing to the difference of level existing between the various sections of any system of sewers, it would often be possible to use filtered sewage as a source of power, and thus to introduce at the same time into the sewage some of the supposed disinfecting products contained in the smoke. In this way decomposition of the sewage would be retarded, and its value as a manure would be increased.

The Temperature of Steam-Engine Cylinder Walls.

Among the selected papers published in the last volume of the Minutes of the Proceedings of the Institution of Civil Engineers, is one by Mr. Bryan Donkin, jun., upon his experiments to ascertain the temperature of the cylinder walls of steam-engines. Mr. Donkin's work in connection with steam-engine and boiler trials has been frequently referred to in the JOURNAL; and there is no more interesting or practically valuable branch of these labours than that which deals with the temperature of steam cylinders. It is in connection with his researches into this subject that Mr. Donkin has been led to try the effect of superheating steam cylinders by means of gas. With the object of carrying out these investigations more thoroughly than had been possible before, Mr. Donkin lately erected in his Bermondsey works a small vertical single-cylinder condensing engine. Experiments have been made with it, in accordance with a system described very fully in Mr. Donkin's paper, for the purpose of ascertaining as nearly as possible the temperatures of the cylinder under various working conditions, and of different parts of the walls under the same conditions. The temperatures are taken in ⅛-inch holes, drilled into the walls at certain depths, and filled up with mercury in which a very small thermometer, duly verified, is inserted. Among other results of these experiments, which were conducted throughout with that thoroughness for which the author has established a reputation, it was found that the effect of complete steam-jacketing, when working non-condensing and with saturated steam of 65 lbs. absolute pressure, cut-off $\frac{3}{16}$, and speed about 220 revolutions per minute, was to decrease the steam consumption some 43 per cent. The mean temperature of the cylinder wall was 297° Fahr. with jackets, and 250° Fahr. without; being an increase of 47° Fahr. The temperature in the cylinder by the mercurial cup was 297° Fahr. with jackets, and 263° Fahr. without. The temperature in the barrel jacket space was 298° Fahr. with steam in jackets, and 246° Fahr. with air in jackets open to the atmosphere. The author admits that the late M. Hirn was the first to put forward these views. He always maintained that the action of the walls was very considerable. This important conclusion, arrived at so many years ago, is thus again confirmed.

COMMUNICATED ARTICLE.

LIGHTING.

By W. H. Y. Webber.

PART I.—THEORY.

(*Continued from p.* 799.)

MM. de Montserrat and Brisac have written a memoir upon "Gas and its Applications," which contains some interesting observations upon lighting. The authors remark that light-sources send their rays in all directions, and that the intensity of these rays varies with their angle to the horizontal. If we suppose the case of a sphere with radius unity (1 metre, for example, having the luminous source for its centre), the lighting projected by the source upon the sphere will not be uniform. It may be expressed for any element of the sphere by the product of the intensity (in carcels) of the ray which strikes this element, by the area of the element—the radius of the sphere being 1, and the area of the element of the sphere being normal to the ray. The total lighting of the sphere, equal to the sum of the lighting of all the elements, may be considered as the total quantity of light emitted from the source. By dividing this total lighting by the superficies of the sphere 4π, or 12·566, we obtain the mean intensity of all the rays—a mean which often differs notably from the horizontal intensity.

Until recently, it has been customary to measure only the horizontal intensity of gas-burners. This method of operating was not open to objection so long as only argand or flat-flame burners free to the air were in question. Practically, the distribution of light upon a sphere of radius 1 is equal for all these burners; so that the total quantity of light emitted is in such cases proportional to the intensity of the horizontal radiation. But since certain inventors—Wenham, Sugg, Danischevski, &c.—have reversed the recuperative burner of Frederick Siemens, and have constructed burners which leave above them a more or less wide conical shadow, it has become necessary to measure their oblique rays; and a number of photometers have been devised for this purpose. The above-named authors remark upon this that the partisans of recuperative burners generally exaggerate the *total* luminous effect of their arrangements, by not indicating their mean spherical intensity, but their maximum effect in a particular direction. This error is the more serious as in many cases the direction chosen for the measurement of the illuminating power is the vertical ray. This ray only lights one point of the sphere already spoken of, and has an effect, in regard to the total spherical lighting, almost *nul;* while the horizontal rays, which light a large circle, are of considerable importance. The economic data advertised for the majority of these hot-air burners ought, therefore, to be considerably discounted. There has been claimed, for burners of 200 litres and less, a reduction of 60 per cent. upon the gas consumption, as compared with the older burners. Tests made by the Jury for Class 27 of the International Exhibition of 1889 showed, by determinations of mean spherical intensity, that the importance of this saving should be reduced to 25 per cent. for the best burners; and the Jury would certainly not have reported any appreciable saving for small recuperative burners if, instead of using the Bengel burner for their standard, they had taken such a standard burner as the Elster, which, with a simple chimney, gives an effect 25 per cent. better than the Bengel.

Almost all gas-burners, the same authors continue, and for that matter nearly all light-sources, are symmetrical with reference to a vertical axis. They constitute a figure of revolution round this axis. The observed phenomena are therefore reproduced identically in all vertical planes passing through the axis; so that it is sufficient to construct the curve of intensities for any one of these planes. The rays which serve as the standard are always the horizontal rays of a standard lamp. Oblique rays can be referred to the horizontal by reflection from a mirror suitably inclined. In the apparatus employed by the Jury for class 27, which was designed by Messrs. Ayrton and Perry, the reflection was always made at an angle of 45°; the quantity of light absorbed at this angle having been previously determined.

Upon the subject of the influence of their size upon the illuminating effect of artificial light-sources, the authors remark that when these are very small, or (which is the same thing) when they are intensely brilliant, the influence on the clearness of perception is prejudicial. It is interesting to determine this intrinsic quality. According to M. Monnier, a square centimetre of flame-area has the following luminous effect.

In a jet gas-flame	0·06 candle.
„ an argand burner	0·30 „
„ a Siemens burner	0·60 „
„ incandescent electric lamps	30·00 „
„ the electric arc	480·00 „

The brilliance of the sun is reckoned to be about 50 times that of the electric arc.

With regard to actual lighting, MM. Montserrat and Brisac remark that this effect depends not only upon the number, the distribution, and the nature of the luminous sources, but also upon several factors, among the principal of which is the reflecting power of walls and ceilings. The first photometers for lighting were designed for the purpose of determining the duration of the exposure in photography. They were based upon the principle that, in enabling printed characters to be read, the light must be the brighter as the characters are made smaller. Schütte has constructed upon this basis a kind of photometrical *lunette*, in which the lighting effect to be measured is diminished in a known proportion, by interposing a sufficient number of translucent papers. The lighting is measured by the maximum number of leaves which can be interposed without altogether effacing figures of a known size.

Appliances of this order do not necessitate the use of a standard light; but it must be acknowledged that they have not the precision of such photometers as those of Weber and Mascart, in which the lighting of a surface is compared with similar lighting by a standard source. The Weber photometer entails two observations for the measurement of one piece of lighting. The user has to compare successively the lighting to be measured and the standard of lighting (such as, for example, a sheet of paper receiving normally the rays of a carcel lamp at one metre distance), to the luminous effect produced upon a small opal disc by an auxilliary source which must remain unaltered during the two inspections. The degree of lighting is then deduced in carcel-metres.

The authors refer to the photometer of M. Mascart, already illustrated; saying that it only requires a single observation, but involves the use of a standard light. M. Mascart prefers to employ for this purpose a moderator lamp burning colza oil, which gives during several hours as steady a light as the carcel. They also remark that the Mascart photometer permits of the determination of the intensities of lighting which satisfy previously settled demands, such as the necessities of different classes of handiwork, &c.

With regard to artificial lighting in general, MM. de Montserrat and Brisac observe that it is desirable to prevent, as far as possible, the intrusion of the light-sources into the field of vision. The field of vision is a cone which has the eye for its apex, and the generatrix of which makes, with the line of fixation, a variable angle (between 50° and 95°). From measurements performed by M. Landolt, upon his own eye, with the head rigidly upright, the upper angle of the generatrix with the line of fixation, or the line of direct sight, is 82°. Lavoisier, in a memorandum published in 1781, laid stress upon this necessity. He proposed to put oil-lamps outside the saloon to be lighted, in the upper part, and to reflect the light downward by elliptical reflectors. He cited the example of Servandoni, celebrated in his time for theatrical decorations, who made the lustres in the Hall of Spectacles in the Tuileries rise out of sight with the raising of the curtain.

In some instances the work to be lighted is that of persons who do not change their places, such as students in schools, clerks in offices, &c. The surfaces of the tables or desks ought in these cases to receive much more light than neighbouring surfaces. The use of Wenham, "Cromartie," Danischevski, and similar lamps, which give their maximum luminous effect in the vertical direction, is indicated under such circumstances. In other cases it is required to light areas where people are constantly on the move, and where there is need of lighting less intense, but more equally distributed. When we move in an area where the sources of light do not distribute uniform illumination, the eye receives, in passing through the brightest spots, an adaptation which prevents it from perceiving clearly the objects in the worse-lighted parts. Excess of light in particular spots is objectionable. In the streets, in places of pleasure resort, in markets, and in show-rooms, this partial excess throws into obscurity objects which would have been distinguishable enough if they had not been surrounded by brighter surfaces. It is advisable, in certain cases, to diminish this excess of light, even by wasting a portion of the light available.

Uniformity of lighting is obtainable in many various ways. Lavoisier, in his Memorandum of 1766 upon the different means to be taken for the lighting of a large town, recommended the multiplication of the number of lamps and the diminution of their intensity, with the employment of reflectors to send down upon the ground the superior radiations from the lamps. Uniformity of lighting can be obtained equally by the use of a small number of intense sources; but it is necessary that they should be such that the variation of the intensity of the radiations, according to their inclination, may correct to some extent the decrease of lighting due to the law of distance.

If we would uniformly light a street or a public place, it is not necessary, according to MM. de Montserrat and Brisac, to follow Lavoisier in the extreme multiplication of lanterns; for the lamp-posts would be a nuisance. Instead, lamps can be used in which the intensity is greater in other than the vertical direction; so that the distant parts of the ground will receive the most intense rays. From this point of view, they give the street lamp known as the "Quatre-Septembre" type (from its having been designed by the Paris Gas Company for the lighting of the Rue du Quatre Septembre), a high character.

The authors conclude by stating that the need for better lighting is making itself felt more and more, not only in saloons, but also in the streets, where good light tends to increased security, and in commerce, where the cost of night work diminishes considerably when the false economy of bad lighting is abandoned. What the latter remark means appears from a report of M. Sartiaux, published in 1878 in the *Revue des Chemins de Fer*. In a goods room at the Chapelle Station, every man employed handled on an average about 850 kilogrammes of goods per hour, during the hours of daylight. Before 1877, with poor lighting, this figure dropped at night to 530 kilogrammes. The night work therefore cost 37 per cent. more than the day work. In 1877 a better system of lighting was decided upon; and since then the weight of goods handled hourly per man at night has risen to 680 kilogrammes. A saving in labour of 30 per cent. has, therefore, followed the improvement of the lighting; and the number of mistakes has greatly decreased.

What may be the limits of this upward movement? M. Mascart sees no other limits to the artificial lighting of interiors than that of daylight. MM. de Montserrat and Brisac, unlike M. Lévy, regard this limit as exaggerated. They are inclined to think that such lighting as the foyer of the Opéra receives (which, according to M. Mascart's experiments, is about 4 metre-carcels on the average) should be good enough for most purposes. They are further of opinion that no better lighting can be desired than that which shall enable a person to read with as little fatigue as in good daylight. This figure is, according to Weber, 5 metre-carcels.

(To be continued.)

The Cost of Electricity.—A French electrician has recently given the price of electricity in Paris as 9d., and in London as 3¾d., per horse power per hour—in each case three times the price of motive power produced by gas.

The Royal Society.—Among the names of gentlemen recommended by the President and Council of the Royal Society for election into the Council for the ensuing year, at the anniversary meeting on the 30th inst., are those of Dr. J. W. L. Glaisher, Dr. J. Hopkinson, and Professor G. D. Liveing, M. A.

Death of Mr. R. H. Carr.—We regret to record the death, on the 3rd ult., of Mr. Richard Howard Carr, eldest son of Mr. William Carr, Manager of the Johannesburg Gas-Works. He had been unwell for some weeks with inflammation of the lungs; but several complications set in, and to these the sufferer, who had borne his trying illness bravely, eventually succumbed, at the early age of 17. He was in the service of the Jumpers Gold Mining Company; and had made for himself a large number of friends in Johannesburg.

Changes in the Gas and Electric Lighting Inspectorships in the County Council.—Mr. G. Mills, Chief Inspector, and Mr. E. Parsonage, stamper and caretaker, at the Westminster gas-meter testing-station of the London County Council, having retired from the service of the Council, Mr. A. Grandshaw has been appointed assistant at that station; and a second assistant is to be engaged. Mr. W. Arnot has resigned his office of Inspector under the Electric Lighting Acts and Orders; and Mr. A. E. Rossiter has been selected as his successor on probation or twelve months. There were 57 applicants for the post.

The Price of Gas in Brussels.—The Gas Committee of the Municipality of Brussels recently had a meeting and discussed at considerable length the two propositions for altering the price of gas which, as stated in the JOURNAL for the 13th ult., were referred to them. The suggestion of M. Richald to reduce the price to the uniform rate of 12c. per cubic metre, and to abolish the double-index meters, met with unanimous approval; and a large majority of the members were strongly in favour of M. Allard's proposal to reduce the charge for gas employed for domestic purposes, if supplied through a separate meter and service-pipe. These decisions were arrived at with all reserve as to their financial bearing, seeing that the Department of the Municipality dealing with such matters have to ascertain if their confirmation is compatible with preserving a proper balance in the budget. However, it is regarded as tolerably certain that the reduction in price would be followed by a compensating increase in the consumption of gas.

Society of Arts.—We have received from the Secretary of this Society (Sir Henry Trueman Wood, M.A.) a prospectus of the arrangements for the forthcoming session, which will open on the 18th inst. with an address by Sir R. E. Webster, Q.C., M.P., Chairman of the Council. Among the questions to come before the members in the form of papers, we notice "The Spontaneous Ignition of Coal and its Prevention," by Professor Vivian B. Lewes, F.I.C., F.C.S.; "Burning Oils for Lighthouses and Lightships," by Mr. E. Price Edwards; and "Secondary Batteries," by Mr. G. H. Robertson. Two of the five series of Cantor Lectures to be delivered during the session will be on subjects in which many of our readers are specially interested —viz., "The Uses of Petroleum in Prime Motors," by Professor W. Robinson, M. Inst. M. E.; and "Developments of Electrical Distribution," by Professor George Forbes, F.R.S. Under the Howard Bequest, a special course of six lectures, on "The Development and Transmission of Power from Central Stations," will be given by Professor W. Cawthorne Unwin, F.R.S. These and the Cantor Lectures above mentioned will not, however, be delivered till after Christmas.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Quarterly Meeting at Birmingham.

As already briefly recorded in the JOURNAL, the Quarterly Meeting of the above-named Association was held at the Great Western Hotel, Birmingham, on Thursday, the 22nd ult. The President (Mr. C. S. Ellery) was unable to attend, owing to business of a pressing nature; and in his absence Mr. R. O PATERSON, of Cheltenham, was voted to the chair. There was a large attendance of members, and also several visitors.

NEW MEMBERS.

The Committee recommended the election of the following gentlemen as members of the Association: Mr. R. Jones, Manager of the Dawley Gas-Works; Mr. E. Layton, Manager of the Sutton Coldfield Gas-Works; and Mr. W. Murray, Manager of the Uttoxeter Gas-Works. The recommendation was unanimously adopted.

ELECTION OF PRESIDENT AND OFFICERS.

Mr. J. ANNAN (Wolverhampton) proposed that Mr. W. Littlewood, of West Bromwich, be elected President of the Association for the ensuing year. He said he believed Mr. Littlewood would make as good a President as those who had preceded him; and therefore he had much pleasure in proposing his election.

Mr. H. HACK (Saltley, Birmingham) seconded the motion; saying he believed Mr. Littlewood possessed all the qualifications requisite for making an excellent President.

The motion was carried unanimously.

Mr. LITTLEWOOD thanked the members very much for the compliment they had paid him in placing him in the honourable position of their President. He assured them that, whatever might be his shortcomings in the presidential chair, he would endeavour to fulfil the duties to the satisfaction of the members of the Association.

Mr. J. S. REEVES (Bilston) proposed that Mr. P. Simpson, of Rugby, be re-elected Treasurer; and the motion was carried unanimously.

Mr. LITTLEWOOD remarked that they could not have had a better Secretary than Mr. J. S. Reeves; but he now wished to retire from the office. He only undertook it again last time on the understanding that he should be relieved from the duties this year. That being so, he (Mr. Littlewood) had pleasure in proposing that Mr. Meiklejohn, of Oldbury, be elected Honorary Secretary. He believed Mr. Meiklejohn would fulfil the duties as well as anyone they could select.

Mr. W. T. TEW (Warwick) seconded the motion, and it was carried.

Mr. MEIKLEJOHN said he was deeply sensible of the honour they had conferred upon him in appointing him Secretary. He accepted the office with diffidence. But the success of the Association depended very much on the unanimity and enthusiasm of the members; and with their support, he should do the best in his power to discharge the duties of the office satisfactorily.

Mr. TEW proposed that Mr. J. S. Cranmer (Stratford-on-Avon), Mr. V. Hughes (Tipton), and Mr. J. S. Reeves (Bilston) be elected on the Committee; the two former being in substitution of retiring members, and Mr. Reeves in place of the late Mr. J. Deakes, of Worcester.

Mr. J. T. LEWIS (Wellingborough) seconded the proposition, and it was agreed to.

On the motion of Mr. J. WARD (Brierley Hill) seconded by Mr. HUGHES, Mr. W. W. Hulse, of Longton, and Mr. J. C. Belton, of Wellington, were appointed Auditors.

THANKS TO THE RETIRING OFFICERS.

The CHAIRMAN proposed a vote of thanks to the President, for his admirable conduct in the chair during the past year. He said they all felt that Mr. Ellery had fully sustained the dignity of the Association, and in many respects had added lustre to it. He was sorry that pressing business engagements prevented the President from being with them to receive their acknowledgments in person. He would include in the resolution a vote of thanks to the Treasurer, Secretary, and Committee. They had all fulfilled the duties of their respective offices to the entire satisfaction of the members; and the least they could do was to accord them a vote of thanks for their services.

Mr. LITTLEWOOD seconded the motion, and it was carried.

THE LATE MR. DEAKES.

The CHAIRMAN said that since their last meeting they had lost one of their most esteemed members in Mr. Josiah Deakes, of Worcester; and they would all agree that it was only right that they should convey to his widow and family their sense of his loss. He moved that the President and Secretary be asked to send a letter of condolence to Mrs. Deakes.

The proposition was agreed to.

ELLIOTT'S PROCESS OF CONTINUOUS CARBONIZING.

Mr. HACK then read the paper on the above subject which appeared in the JOURNAL for the 27th ult. (p. 755). It was fully illustrated by diagrams, and was listened to with great attention.

At the close of the paper,

The CHAIRMAN remarked that the members were supposed to leave to visit the Birmingham Oxygen Company's works at Saltley at three o'clock; and as it was then half-past two, there would not be sufficient time to discuss the paper if they were to keep their appointment at the Oxygen works.

Mr. HACK expressed his willingness for the discussion to be adjourned; and said that, under the circumstances, this seemed to be the best course.

Mr. ELLIOTT, on being appealed to, said he hardly thought there was time for a discussion then; and he himself thought it would be better that it should be taken at another meeting. He added that he considered the unfavourable results set forth by Mr. Hack in his paper were due to low temperature and excessive leakage. He could not understand the low yield of gas and the small production of tar. He had found the system work well with him at Ludlow.

Mr. C. HUNT (Windsor Street, Birmingham) asked if Mr. Elliott had any particulars of the working at Ludlow—not as regarded the tar and liquor only, but of the yield of gas.

Mr. ELLIOTT said he had not; but he was now working the system there, and he invited anyone to go and see it.

The CHAIRMAN said they all felt—and he was sure Mr. Hack felt it as much as anyone—that there was a certain amount of regret attending the reading of the paper. Their friend Mr. Elliott had been working this particular system for years; and it was difficult to understand why there was such a difference between his results and those obtained at Swan Village by Mr. Hack. He (the Chairman) had seen the process in operation at Ludlow that week; and Mr. Elliott was evidently getting good working results. But there was obviously too little time that day to go into the question and discuss it thoroughly. He would venture to point out that the effect of discussing the paper then, and closing the matter, would be that the process, which was admittedly a novelty, would be absolutely condemned in the eyes of professional gas engineers. Whether or not the results obtained were to be entirely relied upon, was, of course, open to discussion, because Mr. Hack admitted that he was not able to account for all the working of the process [Mr. HACK: Not the bad working]. He did not, for instance, account for the weight of coal put into the retorts; and this fact necessarily left the experiment in an unsatisfactory condition in their minds, judging as gas engineers. They must be just to Mr. Elliott. He claimed advantages from this particular process; but he (the Chairman) was not aware that he had fixed himself to results one way or another. What Mr. Elliott said was: "I have invented a system which practically gives you a continuous process of gas making. You take a closed retort. At the one end you draw off the coke, at the other you put in the coal; and at neither of these ends do you take off the lid, or admit air to the retort, as in ordinary gas making." That was an important fact. It might not be a successful adaptation—that he said nothing about—but it was an invention which appeared to give them, from some points of view, considerable advantages; and there might be more in it than they were yet inclined to think. Mr. Elliott maintained that it had advantages; and he (the Chairman) did not think they would be prepared to condemn the process just at present, without looking more fully into it. He did not know that Mr. Elliott had claimed any particular results, and risked his reputation upon them; but the members were risking his reputation upon the acceptance of the paper. He would therefore ask Mr. Hack to allow the discussion to stand over till another meeting. There would, in the meantime, be an opportunity for thinking over the matter, and probably seeing Mr. Elliott's own working of his system at Ludlow. He was sorry to be in the chair, and to have to make these remarks in a *quasi*-judicial character; but he thought it was due to the subject, and also to their friends Mr. Hack and Mr. Elliott.

Mr. C. HUNT said that after what had fallen from the Chairman no discussion that day could be entirely satisfactory, either to Mr. Elliott or to Mr. Hack. No one could wish that there should be even the appearance of an injustice to Mr. Elliott; and he suggested that, in the event of the discussion being adjourned, a Committee should be formed to investigate at Ludlow the working of the system, and report thereon to the Association.

Mr. HACK asked if Mr. Elliott was prepared to measure the gas and the residuals; because without this no Committee could form an opinion about it.

Mr. ELLIOTT said the stoppage was causing all Mr. Hack's trouble.

The CHAIRMAN remarked that it would be well not to go into any point then. If Mr. Hunt's suggestion was adopted, was it possible tc disconnect the patent retorts from other parts of the works, and enabling them to collect the products?

Mr. ELLIOTT said there was no possibility of doing so now; but it could be done in the summer time.

Mr. HUNT said he understood that all the gas supplied at Ludlow was produced by these retorts.

Mr. ELLIOTT: In the summer time.

Mr. HUNT: Then I am afraid the investigation will have to be postponed till the summer.

Mr. HACK: If these retorts have been at work exclusively in the summer time, you would have the figures as to gas, tar, and liquor.

Mr. ELLIOTT: Not as to the tar and liquor.

The CHAIRMAN (to Mr. Elliott): Are you agreeable to the course suggested?

Mr. ELLIOTT: I shall be very pleased to fall in with it.

Mr. HACK: I do not like leaving the results shown by the paper; and I should desire to see if it is possible that success can be achieved by the process. I support the proposition for the adjournment of the discussion of the paper. The suggested Committee might, I think, also go to Swan Village, and there examine the apparatus.

Mr. HUNT then proposed that a Committee be formed, consisting of the Chairman of the meeting (Mr. Paterson) and the President, ex-President, and Mr. Hack, to further consider the subject of Mr. Elliott's retort-charging apparatus, and to report to the next meeting.

Mr. ANNAN seconded the motion, and it was carried.

The members afterwards visited the works of the Birmingham Oxygen Manufacturing Company at Saltley, some particulars of which have already been given (*ante*, p. 754). On their return, they dined together at the Great Western Hotel.

AMERICAN GASLIGHT ASSOCIATION.

We learn, from copies of American technical journals just to hand, that the nineteenth annual meeting of the American Gaslight Association, which was held in New York on the 21st and 22nd ult., was, on the whole, one of the most valuable ever held by the Association. It was unfortunate that the President for the year—Mr. J. P. Harbison, of Hartford (Conn.)—should have been so prostrated by an attack of fever as to be unable to direct the proceedings, although he was sufficiently recovered to undertake the journey to New York, and put in a welcome appearance on the second day of the meeting. The indefatigable Secretary—Mr. C. J. Russell Humphreys—was also incapacitated by illness from discharging his accustomed duties. However, the place of the President was ably filled by the next official in command—Capt. W. H. White, of New York; and Mr. A. C. Humphreys undertook the secretarial work which his brother was compelled to relinquish. Ample provision was made for the comfort of the members and visitors by the Committee of Arrangements; and there was a good representative muster, including a number of ladies.

The proceedings opened in the Scottish Rite Hall on the morning of the 21st; the first business being the presentation by the Acting Secretary of the names of 52 candidates for membership, classed as follows: Members, 41; associates, 10; transfer from associate to member, 1. These gentlemen had all been approved by the Council; and they were duly admitted, and formally introduced by the President. The report of the Council was then read. It contained, among other recommendations, one to the effect that papers should be in the Secretary's hands not later than Sept. 1, so that copies might be printed and sent out to the members well in advance of the annual meeting; also a suggested amendment of the constitution of the Association, allowing those employees of a company whose positions are such as those generally filled by active officers of the undertaking, though they might not be so designated officially, to become eligible for active membership. The report was adopted after discussion. The Secretary's report next came up and was received; and this was followed by that of the Treasurer, which showed a balance in hand of $514, and a credit of $1215 from membership dues—making the total net assets of the Association, $1729. The President then reported that the Sub-Committee of the World's Fair Committee had visited Chicago and interviewed the Commissioners, who did not show any disposition to permit of an extended display of gas appliances at the forthcoming exhibition, or to make any contribution towards the erection of a building for such purpose. The report was received, and the Committee were thanked for their services and discharged. The Committee on Nominations reported the following nominations of officers for the ensuing year: *President*—Capt. W. H. White; *Vice-Presidents*—Messrs. A. E. Boardman, W. H. Pearson, and Walton Clark; *Secretary and Treasurer*—Mr. A. B. Slater, jun.; *New Members of Council*—Messrs. J. B. Crockett, C. J. R. Humphreys, J. Young, and I. Butterworth. These nominations were approved. The President then gave a brief address, in the course of which he referred to some of the suggestions contained in the report of the Council; making special allusion to the printing of the papers in advance. This concluded the business of the morning sitting.

In the afternoon, the reading of papers commenced. The first one taken was by Mr. C. H. Nettleton, on "Leakage;" the writer showing how, in the course of ten years, he had reduced his leakage from 9·1 to 2·7 per cent. The paper was discussed at some length. Mr. Walton Clark followed with a paper on "Meter-Rents: A Question of Equity and Policy." The author advocated the charging of rents, or of the proportionate items grouped for convenience under this head, as a matter of equity; believing it would eventually prove a matter of policy. Dr. Wilkinson's paper on "Lime" came next; the writer recommending the purification of gas by this material, and the utilization of the spent stuff by making it into bricks and reburning it. Both of these papers were freely discussed; and the day's business then closed.

The first paper presented on the following morning was that of Dr. E. G. Love, on "The Illuminating Power of a Mixture of Coal and Water Gases." The subject was, as may be supposed from the author's position as Gas Examiner for New York, treated scientifically; and it contained results of the author's experience. It was attentively listened to and fully discussed. The technical business was interrupted for a moment by Mr. Littlehales, who, in a few appropriate words, moved the appointment of a Special Committee to prepare proper resolutions to be engrossed and forwarded to Mr. C. J. R. Humphreys, who retired from the position of Secretary after holding it for eight years. This was agreed to. It may also be mentioned that these resolutions will be accompanied by a testimonial in the form of an elegant chest of solid silver table-ware. The paper of Mr. D. Douglas, of Savannah, upon "Manipulation of Tar from Carburetted Water Gas," was next presented. The writer gave a description of the difficulties he had met with in handling the tar, and the necessity that arose, not only for some method of getting rid of it, but of doing so with a profit. He described his different experiments, and exhibited, in diagram, the form of apparatus at present used by him. He reported that the call for the asphalte product which he prepared, according to a formula which he gave, was many times greater than the supply could be. He had found the sale profitable, though the manipulation and preparation for the market were tedious. Discussion upon the paper was postponed, owing to the entrance of Mr. Harbison, who received a cordial welcome, and took the chair. After briefly alluding to his recent illness, he referred to his promise, made at Savannah last year, to tell the Association something concerning his new water-gas plant. This he did at some length; referring, among other points, to the fact that he was now getting excellent results from his coal-gas products, while the further richness of his water gas gave a mixture of much higher candle power than the coal gas alone formerly yielded. When the electric light came, he at once lost 12½ per cent. of his output, in the shape of street lighting. He found it impossible to compete with the electric light by simply furnishing coal gas; and therefore he had recourse to water gas. At the present time, for his coal-gas tar he was getting $5 per barrel; while the price of coke had gone from 6c. to 10c. per bushel. In addition to this, he was driving out the electric light. Another result accomplished was that the city had, a year or more ago, appointed an inspector to test the gas at regular intervals. This office had been abolished within the past few days, as the reports received as to the quality of the gas all over the city were so satisfactory that the authorities considered the further retention of the inspector to be a useless expenditure of money. At the close of Mr. Harbison's remarks the meeting adjourned.

At the afternoon sitting, Mr. White resumed the presidential chair. The first business was to fix the place for holding the next meeting. Boston, Montreal, and San Francisco were proposed; and Boston was decided upon. A member then referred to some criticisms which a technical journal had passed upon the World's Fair Committee; and a resolution thereon was referred to the Council. The discussion on Mr. Douglas's paper was then taken up; and a spirited debate was the result. Mr. A. B. Slater, jun., the new Secretary, next presented a paper on "Intensity of Light;" and Mr. Rollin Norris followed with one on "The Theoretical Effect of Pre-Heating Blast, Steam, and Oil in the Manufacture of Water Gas." Each paper was well discussed; and this brought the reading of papers to a close. A new Committee on the World's Fair was then appointed, as well as one to make the necessary arrangements for the Boston meeting next year. These matters disposed of, technical business again came to the front by the opening of the "Question Box." Some of the queries gave rise to replies which, we are told, were more amusing than instructive; and one question—"What comes properly into the estimate of the cost of gas in the holder?"—was referred by the President to "the next generation." All that now remained was to pass the usual complimentary votes. The thanks of the Association were unanimously accorded to Mr. A. C. Humphreys for the more than excellent manner in which he had taken charge of the affairs of the organization, at very short notice, in the enforced absence of his brother; and also to the Acting President for the way in which he had conducted the proceedings. These pleasant duties discharged, the meeting was brought to a close.

The papers and discussions will, as usual, be more fully noticed in subsequent issues of the JOURNAL.

Death of Mr. J. Thornhill Harrison.—We regret to record the death last Wednesday, at his residence in Ealing, of Mr. John Thornhill Harrison, who, as one of the Engineering Inspectors of the Local Government Board, was personally known to many of our readers. In early life, Mr. Harrison worked under Brunel in the construction of the Great Western Railway; but afterwards he relinquished engineering for agriculture. He was a member of the first Rivers Pollution Commission; and had for 20 years held his appointment at the Local Government Board. He was in his 77th year.

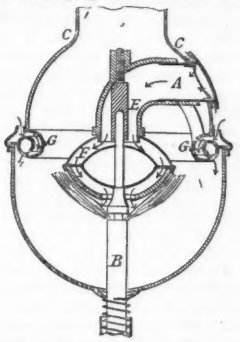
REGISTER OF PATENTS.

Gas-Engines.—Stuart, H. A., of Bletchley, and Binney, C. R., of Hackney Road, London. No. 15,994; Oct. 8, 1890. [8d.]

The primary object of this invention—an improvement on patent No. 7146 of 1890—is to provide means whereby the necessary quantities of combustible vapour or gas and of air may be drawn in during the suction of the out-stroke of the engine piston, when a permanent igniter is employed, without liability of pre-ignition. For this purpose there is attached to one end of the cylinder an explosion chamber, of sufficient capacity to contain the combustible charge. The opening or passage which establishes communication between the cylinder and the explosion chamber is contracted in area—that is to say, of much less diameter or area than the cylinder or the explosion chamber in transverse section; and the inlet for the air is formed in the walls of the cylinder, and that for the combustible vapour or gas in the walls of the explosion chamber. In this way, air can only enter the explosion chamber from the cylinder through the contracted passage.

Regenerative Gas-Lamps.—Danischevski, J., of Paris. No. 17,565; Nov. 1, 1890. [6d.]

This invention (in the words of the patentee) has for its object "to dispense almost entirely with the regenerative chamber employed in this class of lamp for heating the air, and which usually occupies considerable space, and, being opaque, obstructs the light."



It will be seen from the illustration that the usual regenerative chamber is dispensed with; an air-inlet A with a cover being provided in the hood C of the chimney, which is made of transparent material. This air-inlet pipe is supported on the stem E, rising from the burner-tube B. The tube B is the gas-supply pipe; the burner being between its upper end and a stem carried by the stem E. The air-inlet leads between the double walls of a lenticular or other shaped metallic chamber F (also supported upon the stem B), the exterior of which is licked by the flame. It thus acts as a spreader; the incoming air being also heated by it. An annular air passage G of scroll-like or tortuous cross-section, with perforations, admits air to the lamp-glass, which air becomes heated by contact with the annulus G.

Shoots for Charging Inclined Gas-Retorts.—Van Vestraut, L., and Graham, M., of Leadenhall Street, London. No. 18,230; Nov. 12, 1890. [8d.]

This invention, relating to improvements in the construction of shoots for charging gas-retorts when inclined from the horizontal line, consists of a shoot having a number of flaps at the respective heights at the back of the shoot, which can be swung into position inside the shoot at any moment. A moveable and adjustable shoot of the requisite length is made to communicate with the coal supply and the mouthpieces of the retorts; and at the level of the mouths are moveable diaphragms or stops (shaped to form the requisite angle with the vertical line and the floor of the retort), which can be put across the channel of the shoot, so that all material falling to that point is deviated from the vertical line into a slide, which makes communication with the floor of the retort. The diaphragms and the coals are thus slid into the mouth of the retort; and the slides and diaphragms are then withdrawn, so as to allow the shoot to be used in a similar manner for the next row of retorts. The diaphragms and slides are fixed at any required level suitable to the heights of the retort mouthpieces. At the back of the shoot are diaphragms fixed loosely to the shoot, so that the diaphragms may slide easily into position. Falling flaps are provided in front of the shoot, to lap under the diaphragms at the back end, or in any other suitable position.

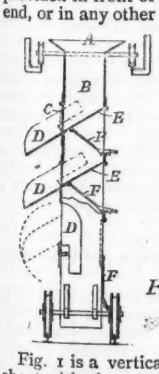
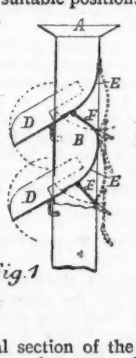


Fig. 1



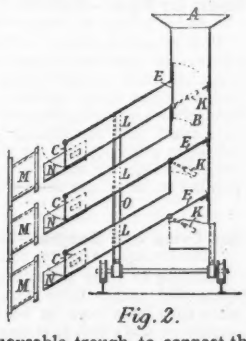


Fig. 2.

Fig. 1 is a vertical section of the moveable trough to connect the shoot with the retort; also a part of a shoot with curved diaphragms. Fig. 2 is a vertical section of a shoot with measuring chambers. Fig. 3 is a vertical section of a shoot with moveable slides. Figs. 4 and 5 are a front elevation and a vertical section of a shoot to feed the retorts on each side.

In fig. 1 the shoot B is made with a receiver A; and near to it is attached a frame with wheels to travel on rails. In various positions moveable diaphragms E are hinged with stays F, which are notched so that the diaphragms may be adjusted to the desired position. In the front of the shoot moveable troughs D are attached working on centres, with a door C to regulate the flow of the charging material. This shoot may be carried below by wheels on horizontal rails.

It will be seen by fig. 2 that the shoot B is applicable to a moveable diaphragm E, operated by a lever K, and a measuring chamber L, with a door C and slide or connection N placed opposite the mouth of the retort M. The measuring chambers L are mounted on a frame O, and are carried on wheels.

Fig. 3.

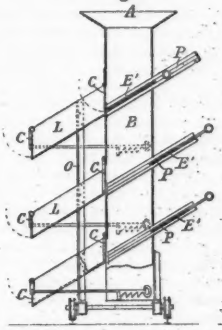


Fig. 4.

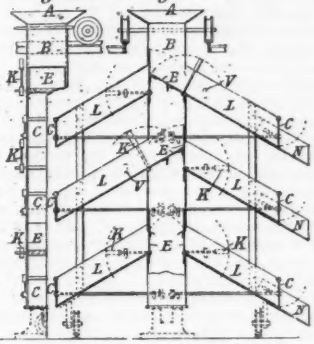


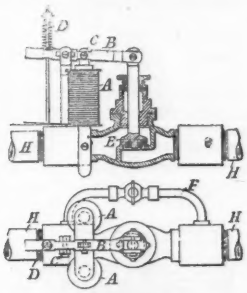
Fig. 5.

To the shoot B and at each measuring chamber, a sliding diaphragm E^1 is fixed working between angle-irons P, and mounted on a frame as in fig. 3. To each measuring chamber there is a door C, with a lever which secures it by the saw-cut notches on the catch. When the measuring chamber is charged with material, and placed near the mouth of the retort, the door C is opened by merely releasing the lever from the catch.

In figs. 4 and 5 the shoot B is shown with a row of measuring chambers L on each side of it, each operated in a similar manner to that described. It is possible to construct a cover T, with hinges R, to any of the measuring chambers. The dotted lines indicate the levers of the diaphragms E and the catch V. Beneath the diaphragms is fixed an angle-plate, in order to support the diaphragms opposite (or *vice versâ*), as in fig. 5. This shoot can be carried on wheels above, or below on wheels; or, if preferred, by a pivot in a socket, as shown by dotted lines.

Controlling Gas Lighting in Cases of Failure of Electric Light Installations.—Swindell, H. C., of Aston, Birmingham. No. 19,234; Nov. 26, 1890. [8d.]

This invention consists in a method of substituting illumination by gas for illumination by electricity in an automatic manner, if by any accident—such as short-circuiting, stoppage of a dynamo, or failure of the accumulators—the electric current should cease, or become much reduced, and so cause partial or complete cessation of illumination.



In carrying the invention into effect, the hall, building, or other electric installation is arranged with gas-jets as well as electric lamps; and there is applied to the gas-supply pipe or pipes H, an electro-magnetic apparatus which controls the gas-supply valve E, in such manner that, so long as the electric current is passing sufficiently to give a fair illumination, the gas supply remains shut off; but so soon as the current sufficiently diminishes, or ceases altogether, then the gas valve at once opens, and the gas-jets are lit by pilot lights.

The patentee proposes sometimes to use a lift-valve on the gas-supply pipe, which is opened and held open by the action of a spring D and a lever B. On the lever there is mounted an armature, which is attracted by an electro magnet; and thus the electric current in use (or a portion of it) passes through the coil surrounding the electro magnet or the solenoid coils A. So long as the current passes in sufficient quantity, the electro-magnet or solenoid is excited; and by pulling the armature or core, it holds the gas-valve closed against the action of the spring D. This cuts off the gas supply to the jets; but by means of a bye-pass or separate pipe (as F), a pilot flame may be kept alight, so that immediately the valve E is opened, the gas-jets are at once lighted. Or the bye-pass may be arranged to supply the jets themselves; so that the flames are turned very low while the electric current is in action, but when it ceases they are immediately turned up.

Gas Lighting Apparatus.—Hatton, E., of Manchester. No 20,454; Dec. 16, 1890. [6d.]

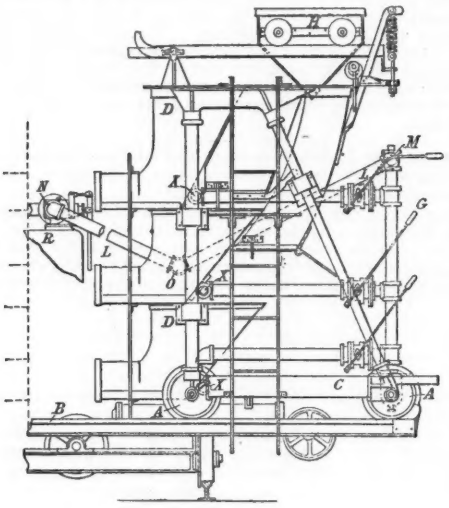
The patentee claims the arrangement of one or more reflectors placed over gas-lights in such a manner that the area of the outlet for the gas

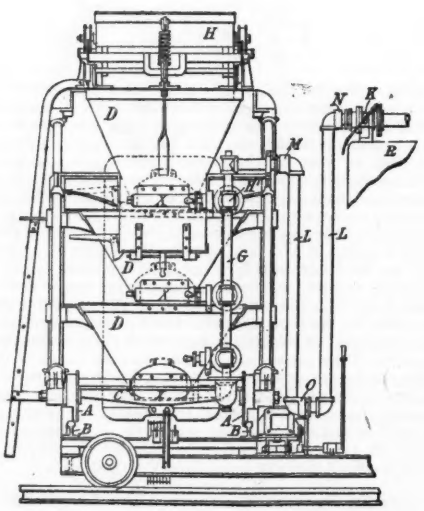
products and heat may be easily increased or diminished, and the distance from the tip of the flame to the reflector be regulated to suit the size of flame, various qualities of gas, and the number of jets, "so as to ensure a steady light, prevent the deposition of carbon on the reflectors, and control the exhaust when used for ventilating lights." He also claims that, by arranging the reflectors in a series of one or more, the tendency of the enamel to chip off is avoided, and the illuminating power of the light, as well as the dimensions of the reflectors, may be increased to any extent desirable.

Retort-Charging Apparatus.—Hickenlooper, A., of Cincinnati, Ohio, U.S.A. No. 12,818; July 28, 1891. [8d.]

Referring to his object in designing this form of apparatus, the patentee says: In existing gas-retort chargers there are employed a wheeled platform adapted to run upon ways parallel with the system of retort-benches in gas-works; a steam-boiler, and a reservoir for the supply of the steam used in charging, mounted on the platform; a supplemental carriage or supporting frame, adapted to run upon the platform, to and from the face of the retort-benches; a vertically adjustable charging-hopper, mounted on the supplemental carriage; and the necessary connections and minor appliances for adjusting and utilizing the apparatus and its parts. In the use of such machines in gas-works, only one retort of the vertical series of retorts in each bench (usually three in number) was charged while the main platform remained in one position; and as the apparatus possessed but one charging chamber and nozzle, it was necessary to adjust it to the level of the retorts successively. In practice, after charging a lower retort (for example) of a vertical series, the supplemental carriage was withdrawn, and the main platform—carrying the entire apparatus—moved aside to allow the coal in the retort to be levelled and the retort-lid closed. Meanwhile the charging chamber was withdrawn and elevated to the level of the next retort; and the main platform moved back into line, and the supplemental carriage again moved forward to adjust the charging-nozzle to the retort. The same operations were performed for the third retort in series; each retort remaining open until charged.

As these operations involved much labour and loss of time, besides waste of heat in the retort-bench, the patentee has designed separate containing and charging devices for each retort in vertical series—two, three, or more as the case may be—mounted permanently upon the supplemental carriage in vertical series, at levels corresponding with the several retorts. The containing hoppers being separately filled





while the entire machine is being shifted laterally from bench to bench, one adjustment of the supplemental carriage brings all the containing hoppers and charging-nozzles into proper relations respectively with each retort of the vertical series of retorts of a bench, instead of requiring removal and readjustment for each separate retort as formerly. Moreover, as each containing hopper and charging chamber is charged ready for action, no time is lost in admitting several charges successively to a common charging chamber; but all being thus made ready prior to the one final adjustment of the apparatus to the retorts, the charging of the entire vertical series occupies only a small portion of the time formerly required—in fact, it is said that, in practice, only from 5 to 15 seconds are consumed in charging an ordinary vertical series of three retorts, each taking about 300 lbs. of coal.

Referring to the illustrations—a side and rear elevation—guide-rails are shown upon which the entire charging-machine is run parallel to the front face of the retorts. On the platform are mounted the boiler reservoir, supplemental carriage or charger proper, and the necessary attachments—only such parts being, however, shown and described as appertain to the invention. The supplemental carriage C is mounted upon wheels A running upon cross rails B, laid upon the floor of the platform, and propelled (by mechanism not shown) for the purpose of adjusting the apparatus towards or away from the retorts. Upon the triangular supporting frames formed by the upright braces of the supplemental carriage is secured a series of two or more—in the present case three—hoppers D terminating below in horizontal charging conduits, constituting charging chambers, the forward ends of which project beyond the front of the supplemental carriage as "nozzles," each adapted in shape and size to enter the mouth of a retort. At the rear of each charging conduit (just behind its angle of junction with the hopper of which it forms part) is located a blast-distributor X. The hoppers are arranged one above the other in vertical succession, with their substantially vertical fronts in a common plane. Their back walls flare rearwardly; and by the succession of the hoppers one above another, each lower one is about half covered at the top by the next above. The remainder of the top opening, however, of each lower hopper is prolonged upwardly to the top of the carriage by an inclined shoot; the first or topmost hopper of the series requiring no shoot. The uppermost hopper and the connecting shoots of the lower hoppers open above in a common horizontal plane at the top of the frame; the three openings being arranged in rearward succession from the front to the rear of the carriage. This arrangement of the openings adjacent to each other in a common horizontal plane makes it convenient to fill them at one time to a common measurement level. The shoots are each closed below by a lid hinged at the rear, and normally upheld by a gravity catch swinging outward at the side. By this construction the shoots may be loaded with second charges before the hoppers are discharged of previous ones. These supplemental hoppers or shoots may be also so proportioned in size as to contain only the proper charge of coal for completely filling the charging-hoppers below.

In lieu of flexible steam connections, a vertical standpipe G is employed at the rear, and on one side of the supplemental carriage, with fixed horizontal steam connections leading thence to the blast-distributors. Controlling valves are arranged in these connections, near the stand-pipe, with their operating handles within convenient reach of the attendant. At its bottom, the stand-pipe terminates in a chamber having an opening in the bottom normally closed by a screw plug or valve, by which the water of condensation may be from time to time withdrawn. At the top of the stand-pipe is a rotating pipe connection M, and at the reservoir a similar rotating pipe connection N; these being connected across by two corresponding joints of pipe L, united at their free extremities by a similar rotating connection O. This forms a hinged pipe connection permitting the movements of the supplemental carriage to and fro, while preserving a proper steam connection of the strength required to sustain the expansive shocks produced by the explosive use of the steam, and also durable in relation to injuries from external heat and abrasion. Moreover, this connection permits of a wide range of movement of the supplemental carriages while preserving a tight and durable steam connection at all times. A controlling-valve, governing the supply of steam through the jointed connection to the stand-pipe, is located at the reservoir R—as shown in the rear elevation.

Ordinarily, says the patentee, when the coal used is approximately uniform in size and character, the uppermost hopper and the shoots, or supplemental hoppers, are convenient measures of the quantity of coal required when exactly filled up to the common level of their tops. In some cases, however, a weighing and distributing car H may be employed, running upon a track-way erected at the top of the carriage, so as to adjust the car to either of the hopper openings. The track-way may be a pivoted frame upheld at one end upon a coiled spring suspended from a cleat, secured to the frame or otherwise provided with weighing devices.

Joints for Pipes.—Robbins, J., of Uxbridge Road, London, W. No. 13,601; Aug. 12, 1891. [8d.]

This invention refers to the construction of pipes or conduits with carriers in the form of recesses, hollows, or cups, to receive plastic material; such carriers being formed either on the spigot or in the socket of the pipes, or both, or on one, or both of the abutting ends of two adjoining lengths of pipes or conduits. The carriers are so formed that the plastic jointing material will be retained no matter in what position the pipe is placed; being made in the form of projections having undercut surfaces, recesses, or cups, which may be parallel to, or at any desired angle to, the bore of the pipe.

Gas Ovens and Ranges.—Fletcher, T., and Clare, A., of Warrington. No. 13,832; Aug. 17, 1891. [6d.]

Alluding to their present proposal, the patentees say: "When gas ovens and ranges have been in use for some time, and particularly when they have been in use on hire, they are frequently allowed to become so dirty that it is necessary to take them completely to pieces in order to clean them effectively. This is an operation which involves a considerable loss of time and expense, and which it is the object of this invention to prevent." For the purpose of the invention, it is proposed to construct and arrange within the gas oven or range an

easily-removeable lining of metal—preferably iron or steel, and preferably also enamelled on one or both sides—which may be removed and cleansed and be replaced with facility.

APPLICATIONS FOR LETTERS PATENT.

18,377.—JOHNSON, A., and THE CO-OPERATIVE INVENTIVE ASSOCIATION, LTD., "Improvements in the method of removing naphthalene from the inlet-pipes of gasholders." Oct. 26.

18,409.—WEBB, G. T. J., "Improved method of producing oxygen gas for illuminating purposes." Oct. 26.

18,424.—LEE, R. A., "Improvements in gas and hydrocarbon motor engines." Oct. 27.

18,498.—LAKE, H. H., "Improvements relating to the manufacture of gas from hydrocarbon oils and to apparatus therefor." A communication from C. H. Wilder. Oct. 27.

18,550.—SAYER, R. C., "Improvements in gaseous pressure apparatus." Oct. 28.

18,608.—CHANDLER, J. C., and SIMS, W., "Improvements in apparatus for purifying gas." Oct. 28.

18,621.—ROOTS, J., and SEAL, J. W., "Improvements in or connected with internal combustion engines." Oct. 29.

18,635.—HILL, J. S., "Improved atmospheric gas-burner with regulating tap." Oct. 29.

18,640.—WEYMAN, J. E., HITCHCOCK, G., and DRAKE, J. A., "Improvements in gas and oil or hydrocarbon engines." Oct. 29.

18,714.—GRIPPER, F. E., and COYLE, S., "Improvements in regulating gas and oil engines for electric lighting purposes." Oct. 29.

18,788.—CLERK, D., "Improvements in starting gear for gas-engines." Oct. 31.

Explosion of a Gas Well.—A telegraphic despatch from New York, through Dalziel's Agency, states that, according to the *World*, a terrific explosion took place at Corapoliz (Penn.) on Monday last week, during some operations connected with the boring of a gas well in a cemetery. It is reported that the volume of gas which exploded caused an upheaval of the earth and the disinterment of hundreds of bodies, as well as the destruction of some costly monuments.

Sale of Shares.—At the Auction Mart, Tokenhouse Yard, on Wednesday last, Messrs. Fox and Bousfield sold by auction nearly one-half of a King's share in the New River Company. There were 48 lots, each consisting of the 120th part of an entire share; and three lots each of a 192nd part. Of the 120th parts of a share, 1 sold at £790; 1, at £770; 4, at £760; 2, at £740; 2, at £720; 15, at £700; 9, at £920; 10, at £680; and 4, at £660. The three 192nd parts were knocked down at £430 each.

The Water Supply of Birmingham.—A lecture on this subject was delivered last Sunday week by Sir Thomas Martineau, under the auspices of the Birmingham Sunday Lecture Society. In the course of it, he gave an account of the early supply of water to Birmingham, and instituted a comparison between the concern as started in 1829 and the magnitude of the present undertaking. In 1829, 41 persons only became customers; and the water-rents reached £133 per annum. The water-rents last year amounted to £136,000; and the sum would have been more by about £30,000 if the Committee had not made large reductions in the rents. The growth went on without check. Last year they supplied 50 per cent. more water than in 1882, and more than double as much as in 1876. The Corporation had undertaken the duties of supplying water, not to Birmingham alone, but to all its vast suburbs, and to a large district beyond. He must, he said, bear testimony with gratitude to the pioneers in the movement which resulted in Birmingham getting the water supply in its own hands—to Mr. Joseph Chamberlain, who was Mayor, and to Alderman Avery, the Chairman of the Water Committee, for the clear insight which led them to undertake the task, and to the extraordinary ability with which, notwithstanding all manner of difficulties, they piloted it to a successful conclusion. They were now face to face with the necessity of finding new sources of supply; and it must be met without delay. They would have to deal with the question boldly, so as to ensure a supply for many years to come of pure water and wholesome, and from sources free from all chance of future contamination. Such sources they had found in the Rivers Elan and Claerwen, in Mid-Wales. The lecture was illustrated by limelight views; and at its close a vote of thanks was passed to Sir Thomas Martineau.

The Shipley Local Board and Gas and Electric Lighting.—Two interesting matters came before the Shipley Local Board at their meeting last Tuesday. The first was a report, by Mr. Hardaker, with reference to an inquiry as to the advisability of adopting electricity as a means of illuminating the public thoroughfares. He said that in the main streets, there were 150 public lamps, and the cost of lighting was £6 6s. 8d. each per annum. Electric lamps of 30-candle power would cost about £6 each a year; but it had been learned, in interviews with the Directors and Manager of the Gas Company, that Bray's patent lamps, of 60-candle power, could be placed in all the principal thoroughfares at the same cost—viz., £6. These lamps could be laid down at a cost of about £300, or a sum equal to an addition of about 1¾d. to the rate. He was of opinion that the extra light obtained from these lamps would warrant the additional expense being entered into. The report was not discussed at this meeting. The second matter which occupied the attention of the members was a resolution, recommending that the Gas Company be asked to delay carrying out a proposed extension of the works until the new Local Board had been elected. Mr. Hardaker, in moving the adoption of the resolution, said that the Company intended to spend £10,000 in the extension of their works; and as several gentlemen who were likely to be candidates at the approaching election had expressed opinions in favour of their acquisition, he thought it would only be reasonable to request the Clerk to write to the Company asking them to postpone the suggested extensions until the new Board had had an opportunity of discussing the advisability or otherwise of purchasing the works on behalf of the ratepayers. Mr. Dunn, who seconded the motion, observed that it was a great misfortune for Shipley that the gas-works were not purchased twenty years ago. The motion was adopted.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Gas Companies' Capital and Dividends.

SIR,—In accordance with the intimation given in my letter of the 25th of September (*ante*, p. 581), I will now, with your permission, offer a few further remarks on the above subject.

The first dividends on gas capital were limited to 10 per cent.; but after a time when investments in gas undertakings had become tolerably safe, Lord Redesdale reduced the dividends on new capital from 10 to 7 per cent.—giving the consumers the benefit of the 3 per cent.

The Companies Clauses Act, 1845, authorizes gas companies to raise, in addition to their regular capital, a certain amount by loan, subject to the option of raising it by capital or loan as they think fit; but when the shareholders found that they could rely upon getting 7 per cent. upon their share capital, they raised all the money they required in that way, instead of partly by shares and partly by loan. The consumers then complained that the companies called up more capital than was really necessary, in order to secure the larger dividend. Be this as it may, rightly or wrongly, it was a charge openly made against the companies which it was deemed necessary to put an end to; and thereupon the regulations now in force were established—viz., "That all new capital should be sold by public auction and the premiums be applied to capital purposes, the same as the nominal amount, but without dividend;" and as this apportioned the premiums between the consumer and the shareholder, it seemed for a time to meet the case very fairly. It was, however, overlooked that, when gas capital is sold by auction, no matter what the dividend may be, it realizes proportionately the same premiums on each class—that is to say, about 5 per cent. The advantage to the consumer of a dividend upon new capital being 3 per cent. less than upon the old was, therefore, by this regulation, entirely destroyed.

Under the sliding scale which followed the sales by auction, it is provided that, for every reduction in the price of 1d. per 1000 cubic feet, there shall be an increase of dividend at the rate of ¼ per cent., whether the dividend be 10 or 7 per cent.—thus giving to the 7 per cent. precisely the same increase as to the 10 per cent.; or, to put it in another form, giving the new shareholders a larger share of the profits than the old.

In a case I had last session, where the application was for further capital, I advised the company, instead of taking the new capital at the usual rate of 7 per cent., with an increase of 5s., to take it at 5 per cent. with an increase of 2s. 6d., and thereby place both classes (the 10 and 5 per cent.) on the same level, instead of having to pay a higher rate of interest upon the 7 per cent. than upon the 10 per cent., as now. The Committee on the Bill, upon receiving this explanation, not only allowed the company to raise the new capital proposed in the Bill at 5 per cent., with an increase of only *two shillings and sixpence;* but cancelled that portion of the old capital at 7 per cent. then unissued, and authorized the company to raise that at the same rate as well. As all new capital must be sold by auction, and it has been found that, in a general way, it all realizes proportionately the same premiums, would it not be better to issue it at that rate at once than to issue it at 7 per cent., and pay a fictitious dividend of 8 or 9 per cent., when the amount actually received upon the sales only gives 5 per cent.? In the case before referred to, some recent sales by auction at 5 per cent., with an increase of 2s. 6d., have realized 108, while all previous sales at 7 per cent., with an increase of 5s., have only realized about 103.

Palace Chambers, Westminster, S.W., Nov. 7, 1891. WM. LIVESEY.

The Board of Trade Memorandum as to Photometers.

SIR,—In reference to the above "Memorandum," I beg to submit that a gas company is *not* bound to have its photometer verified and stamped, as contended by the Standards Department of the Board of Trade in the Memorandum, on the following two grounds: (1) Because a photometer is not a "weight, measure, weighing instrument, or measuring instrument" within the Weights and Measures Acts, 1878 and 1889; (2) because, even assuming that it were, the Inspectors of Weights and Measures of the county or borough, as the case might be, would be the proper authorities to inspect and verify, in accordance with the local standards, and in the locality—so far as regards all places where such inspectors exist, which would include most gas companies of importance.

As to the first ground. The Act of 1878—41 & 42 Vict., cap. 49—was (*vide* preamble) to consolidate the law relating to weights and measures; and to ensure (*vide* sec. 3) uniformity of weights and measures throughout the kingdom. The Act makes provisions (sections 4 to 7) as to the standards of weights and measures, which are the yard and the pound *only*, and also (sec. 8) as to the secondary standards, which are set out in the second schedule. These are: As to "measures of length"—the chain and links, rod, pole, perch, foot and inch; as to "measures of capacity"—bushel, half bushel, peck, gallon, half gallon, quart, pint, half pint, gill, half gill, and the fluid ounce, drachm, and minim; as to "weights"—the ounce, dram, grain, and pennyweight of avoirdupois and troy weights; and as to "coin weights"—the weights of the various coins in grains. Thus, not only does the schedule *not* include anything applicable to the testing of the illuminating power of gas, but the simple enumeration of the standards, as above, shows conclusively that a photometer was never within the contemplation of the draftsman or promoters of the Act, any more than it is within its words and intent. I may be reminded that the same section empowers the Board of Trade to cause "new denominations of standards to be made and duly verified." But it does so only when such standards are "either equivalent to or multiples of, or aliquo parts of, the Imperial weights and measures, ascertained by this Act"—*i.e.*, as set out above. When the Act (sec. 18) authorizes the metric system, it does so only as set out in the third schedule—*i.e.*, as to "measures of length"—the metre; as to "measures of surface"—the are; as to "measures of capacity"—the litre; as to "weights"—the

gram; and the recognized decimal multiples and fractions of each. Here again, and thrice repeated, we have a confirmation of the above conclusion.

Again, when (section 47) it authorizes inspectors to take fees for verification and stamping as set out in the fifth schedule, fees are appointed only for weights and measures as above, and no fee is provided for verifying or stamping any instrument for testing illuminating power; and thus we have one more confirmation of our conclusion. But in sec. 66, as if to clinch the argument, the Act is *expressly* applied to the verification of model gasholders (gas-meters) under the 22 & 23 Vict., cap. 66; and *expressio unius est exclusio alterius*.

Lastly, in all the enacting sections—sec. 24, as to penalty for using or possessing weights or measures not of the denomination, &c.; sec. 29, as to stamping or verification as measures and weights, and the penalty for the omission thereof—the enactment is restricted to any measure or weight used for *trade*, which word is defined (sec. 19) to mean "any contract, bargain, sale, dealing . . . made and had according to one of the Imperial weights or measures ascertained by the Act"—*i.e.*, as before enumerated. So that an examination of the 1878 Act conclusively shows that a photometer did not fall within its provisions.

Let us now turn to the Act of 1889 (52 & 53 Vict., cap. 21). By sec. 34, this Act and the 1878 Act are to be construed together as one; so that "weights and measures" will have the same meaning in both Acts. By sec. 6, the Board of Trade may make new denominations of standards for the "measurement of electricity, temperature, pressure, or gravities . . . for use for *trade*." Now, it is evident that photometry does not fall within either of these terms; and, further, it seems clear that, but for this section, the Act would not apply even to such extensions of the term "measures," and *a fortiori* does not apply to the determination of the intensity of light. Again, when the Act substitutes fees, as set out in the first schedule, for those of the old Act, fees are provided only in respect of such weights and measures as before, and none is provided for the verification of a photometer. And, once more, to clinch the argument, this Act is (sec. 15) *expressly* made to apply to testing gas-meters, under the 22 & 23 Vict., cap. 66, "An Act for Regulating Measures Used in Sales of Gas;" and if, but for this express enactment, the Act would not apply to a meter, or measure for the *sale of gas*, *a fortiori*, in the absence of a similar enactment, it will not apply to instruments *not* for measuring or weighing for *sale*, but for determining the "quality," "intensity," or "illuminating power" of gas (for such are the terms used in the Gas-Works Clauses Act, 1871, the Gas and Water Works Facilities Act, 1870, Amendment Act, 1873, the Burghs Gas Supply (Scotland) Act, 1876, the Metropolis Gas Act, 1860, the Commercial Gas Act, 1875, The Gaslight and Coke Company Act, 1876, &c.) *not* for the purpose of *trade*—selling a certain quantity of gas—but to comply with the requirements of the Special Acts as to *quality*.

The Act defines "weighing instrument" and "measuring instrument"—terms used in the Act—the first to include "scales with the weights belonging thereto, scale-beams, balances, spring-balances, steelyards, weighing-machines, and other instruments for weighing," and the latter to include "any instrument for the measurement of length, capacity, volume, temperature, pressure, or gravity, or for the measurement and determination of electrical quantities." The first three terms are those used in the 1878 Act, and the last four are to cover any new denomination of standard authorized under sec. 6. But had sec. 15 been omitted, could anyone have contended that either of these new terms included, or could have been intended to include, a photometer? When (sec. 8) the Act authorizes fees as regards "weighing or measuring instruments," it does so, *not* in respect of *verifying* and *stamping*, but only "on the examination or testing" of them.

Finally, the only section requiring a verification and stamping (sec. 1), applies solely to "weighing instruments," and *not* to "measuring instruments," and then only when for *trade* (as above defined).

On these grounds, I submit that a photometer does not come within the Act. My second point I must, on account of the length of this letter, postpone, with your kind permission, to a subsequent issue.

A Barrister-at-Law and Gas Director.

Lincoln's Inn, Nov. 5, 1891.

Gas in Denmark.

Sir,—The article on the progress of the Danish Gas Company in the Journal for Oct. 20, and an earlier paragraph in the number for April 7 (p. 637), on "Differential Prices and One Meter," seem to indicate that your information about Danish affairs is not quite consistent with reality; and this induces me to offer a few remarks and corrections.

During the first half of this century, Denmark suffered, after the bombardment of its capital, the loss of its navy and its mercantile fleet, the Schleswig-Holstein war, &c. But after 1850, the free Constitution and the successfully-ended war roused the old spirit of the Danes; and they commenced the second half of the century as a new and enterprising nation. They certainly, therefore, do not deserve your epithet "stolid." A few figures will prove this better than words can do. The population in your "most steady-going of towns" was—

	1860.	1870.	1880.	1890.	Works Completed.
Copenhagen (city) . .	155,000 ..	181,000 ..	235,000 ..	312,000 ..	1854
Frederiksberg (suburb) .	8,000 ..	17,000 ..	26,000 ..	47,000 ..	1860
Odense	15,000 ..	17,000 ..	23,000 ..	30,000 ..	1854
Aarhus	10,000 ..	15,000 ..	25,000 ..	33,000 ..	1854
Randers	10,000 ..	11,000 ..	14,000 ..	17,000 ..	1854
Aalborg.	9,000 ..	12,000 ..	14,000 ..	20,000 ..	1854
Elsinore	8,000 ..	9,000 ..	10,000 ..	11,000 ..	1854
Assens	3.000 ..	3,200 ..	3,500 ..	4,000 ..	1854
Viborg	4,000 ..	6,000 ..	7,000 ..	8,500 ..	1860
Veile	4,500 ..	6,000 ..	7,000 ..	9,000 ..	1860
Flensburg (Schleswig) .	18,000 ..	23,000 ..	31,000 ..	36,000 ..	1854

Note.—The gas-works in Copenhagen belong to the town: those in Aarhus were purchased by the town from the Danish Gas Company. The remaining works are still in the Company's hands.

Besides these works, 29 towns with from 2000 to 17,000 population—a total of 160,000 inhabitants—have established their own gas-works. Before 1852 there were no gas-works in Denmark (except in a few private establishments), nor were there any in the North of Europe farther north than Hamburg; and the results obtained by English gas companies in some of the principal towns in Germany, charging excessively high prices, and consequently having a very limited consumption of gas, were certainly not very encouraging. For example—Berlin, started by an English Company in 1826, with a price of 10s. per 1000 cubic feet; Frankfort-on-the-Main, in 1828, with a price of 10s.; Trieste, in 1844, with a price of 13s. 6d.; Hamburg, in 1846, with a price of 8s.; Prague, in 1847, with a price of 10s.; Düsseldorf, in 1848, with a price of 16s.; and Munich, in 1850, with a price of 8s.

In 1850 there were in Denmark only mechanical and military engineers—no civil engineers; but the writer, together with Mr. T. A. English (of Anglo-Danish extraction, born and educated in Denmark) established themselves as the first civil engineers in Copenhagen. In the following year they succeeded, after much up-hill work in England, in forming the Odense Gas Company; and it certainly was no easy task to find subscribers for the first 450 lights, which, besides the public lights, were the *sine quâ non* dictated by the Board. But this trouble overcome, and the works successfully started, gas was taken to by the Danes, not in a "stolid" way, but rather with enthusiasm; and the Danish Gas Company was formed to supply the universal demand for light. The contracts with the next eight towns were proposed, settled, and sanctioned in less than six weeks, without trouble and without feeing or bribing anyone. All the building, pipe laying, &c., was done by native contractors and workmen; all the house fitting, by local smiths, coppersmiths, and tinmen, who under the engineers' control, soon became intelligent, careful, and enterprising gas-fitters. Ironmongers in every town established well-assorted stores of pipes and fittings; and nothing stood in the way of a very fast development of the gas business, except the high price (6s. 8d. per 1000 cubic feet in Odense, and 7s. 9d. in the other towns), and the objectionable meter-rent insisted upon by the Board.

After some years, Messrs. English and Hanssen, in consequence of a resolution of the Board which they could not approve of, resigned their connection with the Company; and an English gas engineer took the technical, and a retired Danish Government official the financial management, and the concern went on. In 1857 they paid 5 per cent. dividend on £60,000 of share capital; and in 1871, 7½ per cent. on £126,750—the average of the 15 years being 7½ per cent. But in the meanwhile inhabitants of other towns, not ruled by foreigners, enjoyed much easier terms of payment, differential low prices for cooking gas, &c.,* and gradually all the towns rose up in rage against the Danish Gas Company. Odense enforced a reduced tariff; Aarhus bought the gas-works; Flensburg had almost concluded the purchase, but was frightened by the threatened competition of the electric light; and the establishment of opposition works in the other towns was only stopped by a speedy reduction of prices, and by the promise (not fulfilled) of abolishing the meter-rent.

The "phenomenal" and "truly wonderful" growth of the Danish Gas Company's output of gas during the ten years referred to was, however, not occasioned by Mr. Marshall, but by a report which the present writer addressed on Oct. 5, 1877, to the Town Council of Flensburg, when acting as mediator between that body and the Company. In that report I advised the town to buy the works rather than fight the Company, and to work them with low differential prices, according to the successful example of Nakskov; and I proved the advantage of this measure by careful estimates. The town authorities acted upon this advice; but just before the bargain was finally settled, they were frightened—exactly as English gas proprietors were—by the electric light. A translation of the report which Mr. Cridland, with my permission, sent to the Board, found favour with the Directors of the Company, and caused the adoption of the lower and differential prices, which afterwards were introduced by the conductors of many other Danish and Continental, and some English gas-works. Southport was the first English town which (in 1880) adopted the system, as recorded in the Journal, Vol. XLI., pp. 963, 1013.

The increase in the consumption of gas during the ten years of Mr. Marshall's management, assisted as it has been by 25 per cent. increase in population in the Danish Gas Company's towns from 1880 to 1890, is, whatever it may be in other parts of the world, by no means unusual, but considerably below the average, and *enormously below* the consumption per head of the population in some of the Danish towns, as shown by the following figures:—

	Year.	Inhabitants.	Gas consumed for—Lighting. Millions.	Cooking, &c. Millions.
Nine towns served by Danish Company.	1880	145,000	86·1	16·7
	1890	182,000	176·6	74·8
Copenhagen city (exclusive of Frederiksberg) . . .	1890	312,000	508·5	113·8

The total consumption in the towns supplied by the Danish Gas Company in the year 1880 was 102,800,000 cubic feet, or at the rate of 707 cubic feet per head of the population. In 1890, the total was 251,400,000 cubic feet, or at the rate of 1350 cubic feet per head. In Copenhagen city last year, the total consumption was 622,300,000 cubic feet, or at the rate of 1994 feet per head of the population.

The differential prices were adopted on July 1, 1888, and the consumption of gas for cooking and engine purposes was: In 1890, first half year, 41,900,000 cubic feet; in the second half year, 71,900,000 cubic feet. In 1891, in the first half year, it was 100,200,000 cubic feet; and it is fast increasing. Twenty-nine provincial towns had in 1888 a total of 160,000 inhabitants, who consumed 247,000,000 cubic feet of gas, or at the rate of 1544 cubic feet per head. Of these towns, Nakskov had 6700, who burnt 24,800,000 cubic feet, or 3710 cubic feet per head; and Pringsted, 3000, who consumed 5,900,000 cubic feet, or about 2000 cubic feet per head.

Copenhagen, Oct. 31, 1891. C. J. Hanssen.

* See "Successful Management of Gas-Works," in Journal, Vol. XXXIII., pp. 966, 991; and Vol. XXXIV., p. 55, &c.

LEGAL INTELLIGENCE.

COUNTY OF LONDON ASSESSMENT SESSIONS.

Sessions House, Clerkenwell, E.C.—Thursday, Nov. 5.

(*Before Sir* P. H. EDLIN, Q.C., *Chairman, and a Bench of Magistrates.*)

The Gaslight and Coke Company's Assessment Appeals.

(*Continued from p.* 809.)

The hearing of this case was resumed to-day.

Mr. *W. A. Valon*, Assoc. M. Inst. C. E., was recalled, and his examination-in-chief continued by Mr. GLEN. Witness agreed with Mr. Eve in putting the tenant's capital at £747,624—a figure arrived at by taking three-eighths of £1,993,664. Residuals he put at £350,658. As to coal, he agreed with Mr. Eve that 150,000 tons was a sufficient stock to keep in hand, provided the normal deliveries were fairly regular. The quantity of 450,000 tons asked for by the appellant Company was excessive. He submitted a table showing (1) the quantity of coal for the current year, divided into equal weekly deliveries throughout the whole of the twelve months; (2) the consumption for every week in the year; and (3) the excess of deliveries over consumption, showing how much would accumulate each week until the maximum quantity was arrived at, and then how this would be diminished again until the 3rd of April, when the quantity would be at its lowest. He had assumed the hypothetical figure of 150,000 tons as a permanent stock throughout the year. Adding the accumulations of the normal quantity on Oct. 17, there turned out to be 456,865 tons in store at the time when the maximum quantity was required. He had been in the habit of dividing the deliveries of coal into, as nearly as practicable, equal quantities throughout the year, with the result that a very small amount of extra stock was required.

The CHAIRMAN: In that calculation, you do not appear to have taken into consideration the contingency of strikes or interruptions of traffic, which might interfere with this equalization of the quantity requisite?

Witness: There is never less than 150,000 tons in store.

The CHAIRMAN: That appears to me to be most important. Mr. Littler will not fail to notice it.

Mr. LITTLER: My observation upon it will be that this table absolutely puts Mr. Valon out of Court on his own figures.

In further examination, witness said he had allowed for working capital £667,898. He took first Mr. Eve's figure of £431,966; then added the amount claimed by the appellants themselves in respect of coal and tar products, £92,500; and stores, £40,000; and allowed £103,432 in respect of coals. This was rather above the usual allowance. In the case of going to Parliament for additional money for new works, the calculation would be about 5s. or 6s. a ton to cover the whole of the floating capital necessary to carry on the works, equal to about 10 per cent. of the real structural value. He had taken 5s. 3d. a ton on 2,000,000 tons, which would be £525,000, as against £667,000 given by Mr. Eve. With regard to stores, he allowed £38,670, or £1330 less than the amount claimed by Mr. Jones. This was the usual and proper allowance as between the hypothetical landlord and the hypothetical tenant. The former had to keep the hereditament in a proper state of repair—in the same state of repair as when the tenant first took possession of it, so as to allow him to earn the rent. The hypothetical tenant's part of the business was simply to carry on the concern; and in doing that, he would require loose plant and stores, but nothing beyond, except his ordinary capital. For loose plant he (witness) agreed with Mr. Eve in putting £80,000 as an ample amount. The general allowance for loose plant in gas-works would be estimated at about £700 per million. That would be in works making a maximum of a million cubic feet of gas a day; larger works would require a smaller proportionate amount for loose plant. Referring to Mr. Jones's allowance of £9000 for mechanical stokers at Beckton, the machine itself actually running on the rails in front of the retorts, might be called loose plant; but the remainder was certainly not. The boilers and wire ropes and other gear were all fixed to the hereditament, and should be treated as part thereof. Again, Mr. Jones had referred to some stoking machinery at Nine Elms. When witness was there, he saw a Ross stoker. But it was not in use, and had not been for some years; so that it might be treated as only old iron. He observed that the appellants' figures allowed, under the heading of "coal," £4965 for tools at Beckton, and only £554 for Nine Elms, although the latter was the second largest station. There were other discrepancies in Mr. Jones's statement. The item of £25,023 for furniture seemed very large; but witness did not question it specifically. With regard to meters, the gross valuation amounted to £366,421. On this he allowed two-thirds, £244,281, which he considered fair. That was pretty near Mr. Eve's figure—in fact, meters were of the same price all over England; so that there was no room for difference of opinion. As to the sinking fund for renewals, put by Mr. Jones at £77,940, witness did not consider any renewal fund necessary in a gas-works; it was a mischievous thing to rely upon, and should not exist. In fact, after all, it did not exist—it was only an allowance on paper. The works ought to be maintained at their proper standard, with repairs from year to year. Repairs came about, especially in large works, very regularly. If a fund was requisite at all, the proper one was the reserve fund. If the expenditure on repairs and maintenance jumped up in one year so as to interfere with the dividend, it would have to be taken from the reserve fund. Parliament, in its wisdom, had allowed only the reserve fund; and this was sufficient for all purposes. For insurance, he allowed 3s. 6d. per cent. He produced a policy in the Alliance Company, covering the gas-works of the Ramsgate Corporation, which was at that figure; and he said he knew of several other gas-works which were insured at the same rate. The policy covered explosions, spontaneous combustion, and all other risks. The independent estimate made by Mr. Eve and witness of the structural value of the whole of the appellants' works was £3,440,822. For the Beckton works and the docks, they accepted Mr. Jones's figures. They allowed £120,000 for the fourteen testing-stations; £175,000 for the land (at the rate of £750 per acre, and taking 2½ acres per million cubic feet of gas made); and £160,620 for the chemical works—making the total valuation £4,017,419. From this they deducted the leasehold property, valued at £7900; thus producing £3,945,592 as the net valuation of the works. The total value of the unproductive or indirectly productive mains was £397,487 (say, £400,000); and the total value of the other mains, £2,404,782, including £456,760 for services—leaving the value of the productive mains at £2,004,782.

Mr. CASTLE: I understand that it was arranged that we should first of all find the total value of the whole undertaking, and then argue what principle of distribution the Court should adopt.

The CHAIRMAN: I took that to be the understanding.

Mr. CASTLE: It is useless for this witness to distinguish between the indirectly and directly productive works.

Mr. POLAND: I do not quite agree with my friend. We must, no doubt, ascertain the rateable value of the whole, and necessarily the rateable value of the indirectly productive portion. When that is done, of course that portion will be distributed upon the usual system, according to the receipts in each parish. But you cannot get at it without having separately the values of the directly and indirectly productive parts.

Mr. LITTLER: It does not matter to us how it is distributed. When the entire value of our undertaking is arrived at, they can cut up our carcase in any way they please.

The CHAIRMAN: The question of distribution will come later.

Cross-examined by Mr. LITTLER, witness said the Company ought to have in stock, to safeguard them against all contingencies, 150,000 tons of coal—four weeks' consumption. This would be plenty. They had this on April 3; and it was ample for that time of the year. On Oct. 1 they should have 336,000 tons in stock; that would be about six weeks' supply, at 50,000 tons a week. This was as much as any works in the country had. The deliveries at Beckton, being effected by steam colliers, were practically as regular as they would be by train. Asked if he had known deliveries interrupted by strikes, he said that certain collieries might strike; but he had never known a general strike—never known the time when he could not buy coals.

Mr. LITTLER: Where would the hypothetical tenant get the money to pay for his coal, according to your scheme? You start him with April—that is the beginning of the quarter; he will not have a halfpenny in hand, except his allowance, until after July?

Witness: Why after July?

When do you expect he is going to get his first quarter's rents in?—On the first of April. We will take that as practically closing the quarter. After the third or fourth week in April, you will have more money coming in than you can possibly spend.

But I am starting as a fresh tenant. The old tenant has cleared out, and put in his pockets the payments or the credits, and I am starting afresh?—Then, according to our allowance, you would have 4½ months in hand when you start.

Why do you say 4½ months?—Because I think that is sufficient.

Do you not know that five-twelfths is the ordinary allowance?—No; I do not know there is any ordinary allowance.

In further cross-examination, witness gave particulars as to his antecedents and present position in the gas engineering profession. He said he was now Gas and Water Engineer to the Ramsgate Corporation, also Engineer to the Westgate and Birchington Gas Company; and he was consulted from time to time in connection with works all over the kingdom. At Ramsgate the coal consumption was nearly 14,000 tons yearly; at Westgate about 2000 tons. The make there was fairly regular; but it would not be so in London, because of fogs. On some days there might be a variation to the extent of 20 per cent. Last winter there was a difference of 50 per cent.; but that was a very exceptional time. This need not make it necessary to have a larger stock of coal; as 50 million cubic feet of gas only meant 5000 tons of coal. Questioned as to why he had disallowed boiler-tubes, retorts, connections, and so on, witness declared that such things were not tenant's chattels at all. He admitted that the tenant had to find the money for them; but it was a mere matter of book-keeping. The landlord being the tenant, and the tenant the landlord, it was adjusted at the end of the year.

The CHAIRMAN: There is no doubt difficulty in a case of this kind, where the appellants are at once landlords and tenants, in apportioning the expenditure as between the hypothetical landlord and the hypothetical tenant; but we have to deal with it as best we can. It strikes me that, in a concern of this character, expenditure of this nature would, in the contract between the landlord and the tenant, be left to the tenant to incur and discharge; and the rent would be apportioned between them on that understanding.

Witness: No doubt there would have to be stock kept in hand in readiness to meet emergencies, where repairs may require to be instantly done.

The CHAIRMAN: Then must there not be, at the outset, an expenditure of money in order to provide that stock?

Mr. POLAND: We shall contend that there should be no allowance at all for tools and stores, which are necessary only for the purpose of maintaining the hereditament in a state to command the rent. True, the tenant must have the tools at his command to meet sudden cases of repairs. But that work is done by the tenant under contract with the landlord; and it is not tenant's capital at all.

Cross-examination continued: For carbonizing wages he allowed 4·40d. He admitted that wages had increased in the last three or four years, but only temporarily; and the machinery now being introduced for charging and drawing retorts, together with the increase in the consumption of gas, would neutralize any advance in wages. He was aware that the actual expenditure of the Company upon their works was £10,441,000; yet he only put the structural value at £6,350,000, and he had been surprised that it was even as high as that. Some of the works were started as far back as 1812; and from that time to the present, before the Companies were amalgamated, capital was being squandered in competition. The appellant Company had bought up the old undertakings, and the amalgamated "watered" capital was nothing like real capital. Before the amalgamation, it had frequently happened that portions of the yearly loss had been charged to capital account. The nominal capital had been piled up from time to time; and it bore no possible relation to the actual value of the undertaking. He would not give the names of any of the Companies in connection

with which there had been this "watering" of capital. He was speaking from general recollection, and confining himself to the period before the amalgamations. No doubt in late years capital charges had been paid out of revenue; but this would not have neutralized the former fictitious increases of capital to which he had referred. For instance, there were all the parliamentary, legal, and engineering expenses. These were part of the nominal, but not of the real capital. He considered that £750 an acre was a fair price to put on the land. At Beckton the land cost £150 an acre. He was surprised to hear that, according to the actual conveyances, the prices paid ranged from £450 to £1000 an acre. As to insurance, the 3s. 6d. per cent. was the all-round sum for which all risks could be covered. The figure would be the same for a large company as for a small one, as the inflammable matter was always in similar proportion.

Re-examined by Mr. POLAND: In conjunction with Mr. Eve, he had eliminated from the tenant's share of expenditure all the expenses which related to the maintenance of the hereditament. The tenant should not have the capital for doing the landlord's work.

The CHAIRMAN: How would the carrying out of these repairs by the landlord, and the treating of them as a repair to the hereditament properly falling on the landlord, affect the assessable gross value—by increasing or diminishing it? Would it enable him to demand more from the tenant, or to get so much less for it?

Witness: It would enable him to demand more from the tenant.

Then it would increase the gross value?—Precisely.

Mr. POLAND: My learned friends claim 17½ per cent. as a deduction upon the tenant's capital. We contend that the landlord's stores and the tools and work applicable to repairing and replacing part of the rateable hereditaments are not for the tenant *quâ* tenant to provide. All tenant's stores are provided for by the witness in tenant's capital.

Mr. *E. Ryde*, examined by Mr. POLAND, said he had taken the gross receipts from the sale of gas, and had applied the present price to the quantity sold in the year ending June 30, 1890. They amounted to £2,267,080. The price of cannel gas had been raised from 3s. 1d. to 3s. 5d.; and the receipts were £91,900. Public lighting and under contracts he put at £138,321; and rental of meters and stoves, at £61,791. The total receipts were £2,559,092, from which he deducted £12,891 for bad debts; leaving £2,546,201. This was the sum which it was reasonable to expect the hypothetical tenant would receive for his year's occupation. Going to the working expenses, coals had cost during the year £1,255,316; and to this he added £1,372,507 as the estimated increased price of 2s. 6d. per ton on the quantity of coal carbonized in the first half year, because presumably the money paid in that period would be in respect of contracts previously made, and the tenant of the succeeding year would have to pay a higher price. This gave the figure of £1,372,507 as the sum the tenant might reasonably expect to have to pay. Purifying materials, wages, &c., he put at £63,419. As regards the residual products, coal, less labour and cartage, being twice the amount received in the last half of the year, when coals were dearer, he had multiplied the actual sum by two as more fairly representing the cost for the succeeding year. This gave £482,450. He had dealt in the same way with the breeze (£14,806), the tar and tar products (£219,124), and the ammoniacal liquor and sulphate of ammonia (£153,512); making together £869,894, and leaving the net cost of coal and purifying materials £566,032. The salaries and wages and gratuities he put at £399,541; and repairs and renewals of meters, at £30,107. For stove fixing, repairs, and renewals, a very large sum was claimed—£37,000, against a receipt of £8216. He found that, in the case of the South Metropolitan Company, the corresponding item in their accounts amounted to 132 per cent. of the receipts. Adopting the same principle here, he arrived at the figure of £10,854. He calculated the tenant would have to spend £10,845 in order to earn £8216. For public lamps, lighting, and repairing, he put £31,128; Directors' allowances, £5500; salaries of Secretary and clerks (management), £15,250; collectors, £28,940; stationery and printing, £7880; general establishment charges, £3124; Auditors' fees, £400; law charges and surveyors' fees (spread over the next five years), £2000. The annuities were £18,346, of which £4538 applied to officers of some of the amalgamated Companies, and ought not, in strictness, to come into the account. He therefore put a sum of £13,808 for these. Official payments, Gas Referees, Official Auditor, and public testing, amounted to £4517. The next item was "repairs of chattels, machines, and apparatus other than those to the rateable hereditament." These were the repairs the tenant would have to do. As to the amount, it made no difference in the rateable valuation of the whole concern, because if he had put too much here, he had left too little in the repairs to the hereditament. He put £100,000 as the profitable figure. Then rates and taxes at 5s. 2d. in the pound, on an assessment of £662,182, came to £171,064. The total working expenses of the tenant were £1,390,136. This deducted from his receipts, left the net receipts at £1,156,065, which was the sum containing the landlord's rent and the tenant's profit. As to the occupier's share, witness took the tenant's capital to be £1,350,000. He assumed that for five months after coming into occupation the tenant must be prepared to pay his expenses practically without looking to the concern. The whole of the tenant's expenses (not including the repairs to the hereditament, but including the £100,000 for repairs to tenant's chattels) amounted to £2,254,130. Five-twelfths of this (which would mean five average months in the year) amounted to £939,221. He took off five-eighths of the five-twelfths, or £226,535, which would be received during the five months from the sale of residuals; leaving £712,686. Then the tenant would have to find meters and gas-stoves, which would amount to £318,400. The yearly cost of coal and purifying materials was £1,435,926; and 6-52nds of that, to cover six average weeks, came to £165,684. Further, he assumed that the tenant would require, in order to carry on the concern, cash at bankers, tools and implements, spare pipes, &c.; and for these he put down £153,230. This did not include the tools, spare boiler tubes, and retorts which the landlord would require to keep the hereditament in a state to command the rent. The Court had in previous cases held that the landlord's repairs ought not to be taken into account. All through this valuation he had assumed the case of a hypothetical tenant and a hypothetical landlord. Here nobody could do the work of repairs so conveniently as the tenant, because he was there to look after them; but if the tenant took upon himself the repairs, he would only pay for rent £662,000, instead of £919,000 a year. On the figure of £1,350,000 tenant's capital thus arrived at, he took 5 per cent., or £67,500. This was a fair and proper interest upon capital employed in the trade. He also allowed 10 per cent. upon the same figure for trade profit, equal to £135,000; and 2½ per cent., or £33,750, for risks and casualties, which could not be provided for in any other way, but which were sure to happen. This covered all kinds of risks—whether the burning of a landing-stage or a strike involving extra outlay for coal or labour. The tenant ought never to touch this 2½ per cent., except to make good such matters. This property was being rated up to its full value; and he considered that the 17½ per cent. he allowed was not more than was reasonable. This percentage worked out at £236,250; the gross value being brought out at £919,815. Then, in order to get at the rateable value, certain deductions had to be made. He took off the actual expenditure on maintenance of works, repairs, and labour, £176,762; likewise £52,185 spent on mains and service-pipes. As to insurance, he assumed that the £2,250,000 worth of property was insured at 7s. 6d. per cent.; this being the percentage at which he had insured railway companies' property. If the previous witness was right in supposing that insurance companies would take gas-works for 3s. 6d. per cent., this item must, of course, be altered; but he had put it down at 7s. 6d. per cent., which was equal to £8436. With regard to the renewal of gasholders, he allowed £20,250 in addition to what the Company had actually put by as a sinking fund to provide for the renewal of the gasholders at the end of 25 years' life. The total deductions for insurance, repairs, and renewals, necessary to maintain the hereditament as a going concern, came to £257,633; making the total rateable value of the whole £662,182, as against Mr. Jones's £452,253. The unproductive works he had taken out from the various valuation lists as follows: Beckton, £76,127; Silvertown, £3270; Bromley, £40,000; Bow Common, £10,061; Bethnal Green, £5500; Shoreditch, £8659; Haggerstone, £6065; Goswell Road, £500; St. Pancras, £16,000; Westminster, £9240; Pimlico, £5014; Kensal Green, £10,000; Fulham, £16,000; Nine Elms and Battersea, £21,000; and Vauxhall, £941. The unproductive mains (high pressure) he estimated at the structural value of £344,938. This figure was based upon calculations made by him several years ago, when he was concerned for the London Company, who were now amalgamated with the appellant Company. Taking 5 per cent. on that figure gave £15,625; and he also put £5998 for sundry testing-stations, valve-houses, &c. This gave a total of £250,000 for the unproductive mains; so that the value of the productive mains was £412,182, to be divided according to the receipts in each parish. This was a fair valuation as between the Company and the parishes.

The cross-examination of this witness was deferred.

Mr. *W. Marshall*, examined by Mr. FULLARTON, said that in his valuation he had adopted Mr. Jones's figures for the receipts. As to the expenditure, he allowed for rents only £2098, as against Mr. Jones's £6823; the difference representing ground-rents, which were not properly tenant's expenses. The parliamentary charges, £6997, he disallowed altogether. They were expenses incurred for the protection of the undertaking, and ought therefore to be paid by the landlord. Mr. Jones's item of £18,346 for superannuation included £4921 paid to the retired officers of the amalgamated works. Witness disallowed this sum, because a tenant in the occupation of the undertaking would have nothing to do with these officers; it was a matter entirely for the landlord—a part of the price paid for amalgamation. He disallowed altogether the item of £1500 for depreciation. A tenant had nothing to do with the depreciation of works on leasehold property; this being a sinking fund to recoup the capital at the end of the lease. He also proposed to allow only £3085 for wear and tear. This was the proper figure to put as the excess of the average repairs required over the actual repairs done. He found, on comparing the expenditure of the account year with that of the preceding year, that there was an abnormal expenditure of £259,377. He proposed to debit this either to the reserve fund, which Parliament would allow to be drawn upon for abnormal expenditure in order to equalize the dividend, or to the fund created by the annual allowance of 2½ per cent. for risks and casualties. The latter fund the Company had not had occasion to utilize since the coal famine in 1874; and it now amounted to about half-a-million of money. He thus arrived at £1,056,049 as the exact amount which the Company appropriated in the year 1889-90 under their statutory powers; and this was what a tenant in occupation would have had under the same statutory powers. The 2½ per cent. last mentioned was independent of the 17½ per cent. allowed on the tenant's capital.

The Court then adjourned till the next morning, when Mr. Marshall was succeeded by Mr. W. R. Chester and other witnesses for the respondents, whose examination occupied the time till the close of the sitting on Saturday, It was understood that Mr. H. E. Jones was to be recalled yesterday to give further evidence on certain points; and then the addresses of Counsel were to follow. There is therefore every prospect of these protracted proceedings being brought to a close during this week.

Berlin Water Supply.—The new water-works at the Mueggelsee, near Friedrichshagen, which were commenced in June, 1890, are expected to be completed early in the year 1893. The total area of land to be utilized for the construction of the works is 77½ acres. It has been estimated that they will supply at first 18,480,000 gallons of water, as compared with 13,200,000 gallons sent from the Strelau works, and 18,480,000 gallons from the Tegel works. When the Friedrichshagen works are completed, it is expected that a supply of 36,960,000 gallons will be forthcoming, which will be quite sufficient for 2½ million inhabitants. The Mueggelsee, from which this large supply of water is taken, is 2½ miles in length, and 1½ miles in breadth, and contains 8800 million gallons of water; 220 gallons per second enter the suction pumps, in order to be discharged into the filter-beds. The water passes through a thick layer of sand and gravel, and is carried by a collecting-pipe to the pumps, which raise it to the Lichtenberg station, a height of the feet. It is thought that the erection of the new works will allow 130 Strelau station to be ultimately dispensed with.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly General Meeting of this Association was held last Tuesday, at the City Terminus Hotel, Cannon Street, E.C.—Sir JULIAN GOLDSMID, Bart., M.P., in the chair.

The SECRETARY (Mr. R. S. Gardiner) read the notice convening the meeting, and also the following report of the Directors:—

The present half-yearly ordinary general meeting of the proprietors has been convened, in conformity with the Association's Acts of Parliament, for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 30th of June last.

The following summary shows the results of the Association's operations during that period:—

The quantity of gas made in the half year ended the 30th of June last was 4075 million cubic feet; and the quantity made in the corresponding half year of 1890 was 3846 million cubic feet—being an increase of 229 million cubic feet, or at the rate of nearly 6 [5·94] per cent.

The total number of lights on the 30th of June last amounted to 1,934,529; there being at that date 139,971 consumers on the books of the Association. At the close of the corresponding half year of 1890, the number of lights was 1,859,764, which gives an increase of 74,765, or at the rate of 4 per cent.

The entire length of mains on the 30th of June last was 1568 miles; the length of mains laid on the 30th of June, 1890, was 1524 miles—an increase of 44 miles.

The increased sale of gas produced a considerable increase in the gas-rental; but, owing to the high price of coal, the profit of the half year under review is not equal to that of the corresponding half year.

Coke and tar continued to yield an increased revenue; but there was a further decrease in the value of ammoniacal liquor.

The plant and mains at all the stations were maintained in a due state of efficiency. The erection of a new gasholder on the Association's Tabor works at Vienna was proceeded with.

The Directors have to report that they have obtained a prolongation of the concession for the lighting of Etterbeek, a suburban commune of Brussels, until the year 1924; and concessions for the lighting of Schmargendorf, Wilmersdorf, and Grunewald, suburban communes of Berlin. They have also acquired the concession and gas-works for the lighting of Lichterfelde, an outlying suburb of Berlin. The concession for the lighting of the small town of Stolberg having reached its termination, the Directors have disposed of the works and mains.

The Directors have found it desirable to add to their ground property at Antwerp, Frankfort, Haarlem, and Vienna; whilst they have sold land for which they had no further use at Ghent, Lille, and Rotterdam.

The Directors desire, in conclusion, to draw the attention of the proprietors to the accounts for the half year ended the 30th of June last. These have been duly audited, and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent. for the half year ended the 30th of June last, and a bonus of 1 per cent., both payable, free of income-tax, on and after the 1st day of December next.

The CHAIRMAN said he noticed that, in attending the half-yearly meetings, the proprietors gave the usual indication of satisfaction by not assembling in such large numbers as they used to do when the prosperity of the Association was not so great as it was at the present day; and this, too, notwithstanding the fact that the number of shareholders was continuously increasing. He found, for instance, that they had now 4499 shareholders or stockholders in the Association, whereas in the last half year they had 4460, or an increase of about 1 per cent. They had therefore a large number of persons interested in the Association who indicated their approval of the proceedings by not attending the meetings, and showing their confidence in the management by not in any way desiring to interfere with the arrangements made by the Directors. But those of them who for years past had come there had expected him—and he had endeavoured on most occasions to do this—to give them information which was important not only with regard to their business but also with regard to the conditions of gas and gas lighting generally. If they had followed the report which had just been read, they would gather that the prophecy which he had ventured to make on the last occasion on which they met had been entirely borne out. He told them then that the results of the half year under review would not be so satisfactory as those of the preceding six months, for the reason that they would feel the full effects of the dearer coal they were then buying. He also informed them that they would not continue, after the half year to which he was now referring, to experience the same disadvantage, because they would then be enjoying the benefit of cheaper coals, as the higher prices had not been, and would not be, permanent. Well, this statement had been almost entirely borne out by the facts; and the result from the current half year would be better than that from the six months he had now to deal with. This only went to show that all gas proprietors and others who were moved to sell their stock, owing to market fluctuations or to statements regarding new charters or other advantages obtained by electrical companies, were exactly the persons whom Stock Exchange speculators desired to influence, because they got rid of their shares in a moment of panic, when there was no justification for it. When they considered the accounts for the half year, they were as satisfactory as they could be under the adverse circumstances of high prices for coal and other materials; and they would be still more satisfactory now that the price of coal would in future be reduced. If they looked at the past half year, as far as their business was concerned, they would see that there had been a reasonable increase in the consumption of gas. They would find that, notwithstanding the fact that electric lighting had been more extensively employed in some large cities where the Association lighted, their increase had not been checked thereby, but that, on the whole, their business had continued its steady progress. The reason for this was obvious. People were beginning to appreciate more and more the advantages of gas for the purposes of heating and cooking. Gas was never dirty, if he might say so; otherwise it would not be good gas, and would not be their gas. Consequently, gas which was clean was the best cooker they could have. It did not depend on the fingers of the cook, but on the regular working of capable mechanical engineers. Therefore he believed it was the best means for preparing good food; and he highly recommended it to everybody for this purpose. There were besides numbers of people who desired to have the show and glare of the electric light, but who found it brought with it certain inconvenience. One of these was that, whereas formerly they used to have the advantage of the heat given off by gas, the electric light did not produce enough to warm their shops; and in many new houses gas was put in for the convenience of the occupier of a shop, to keep it warm and comfortable during the dark and cold weather. This showed that the story of gas was not yet played out. He was still a believer in its usefulness, and in the prospects of the business connected with it. He did not know that anything he had seen, on the Continent of Europe or elsewhere, would lead him to say that gas was going to be superseded by anything. There was a further observation which he thought it was perhaps right to make, and that was that there was another side to the question. They who were interested in foreign gas companies should remember that foreign municipalities were eminently exacting, and that as the companies endeavoured to meet the requirements of their customers, the municipalities very often expected unreasonable advantages, for the purpose of satisfying their *clientèle*, and also of reducing the legitimate profits of the companies. Now, as he had said before, and as the proprietors would see by the capital account, they did not get a larger return than 7 to 8 per cent. on the money sunk in the business, and he contended that an industrial undertaking which was only earning this amount on the capital invested was not making undue profits; and if they desired, considering the risks involved, to maintain the profits of the proprietors at this level, the Directors were not doing anything unreasonable to the municipalities on behalf of the Association. They had to struggle, in the interests of the proprietors, to keep up their position, which he hoped would always be done in a manner fair to both parties concerned. He said the report they had heard read went to show that the condition of their business was satisfactory, and that while they were doing their best to maintain their position, they were treating the public fairly, and had no exaggerated profits. This being so, he did not know that it was necessary for him to say more upon the history of the six months now under review. He would, however, make two or three general observations, both as to what had occurred since the accounts closed, and with regard to the general position of gas matters. The proprietors would remember that he had told them that for some time past the Directors had been busy building new offices upon a site they acquired close to Drapers' Gardens for the purpose of getting new premises for the Association; the accommodation in the old house being totally insufficient for the staff, and for the work they had to get through. They thought they would have been able to move into the new quarters by the end of next month. But every now and then something prevented anticipated arrangements being concluded; and the carpenters of London having thought it right to indulge in a strike, the business of the Association was interfered with for 23 weeks. The result was that the roof could not be put on the building, which was at a standstill. Consequently, they did not expect to get into it before next Midsummer, instead of at the time they originally anticipated. The next observation he had to make was that the proprietors would have noticed, in the report, that the Directors referred to their policy of extensions in the suburbs of the greater towns they lighted. They were steadily pursuing this policy in all the great capitals they served; and in the course of the next half year, he believed they would see several instances of the success of it. He thought, however, he might add that they always endeavoured, where there might be any difference of opinion between local authorities and themselves, to come to a peaceful settlement, rather than try the arbitrament of law. There were several lawyers on the Board as well as himself; and, having a wholesome horror of law, this was the principle they adopted. He considered it was a very wise and sound one. Although it might be useful to the profession which he had never adorned, but which he would have been glad to adorn, to give it good fees, it was better for the proprietors that every dispute should be amicably arranged. On the whole, he believed the Directors had been successful in steering their good ship free of many difficulties; and he thought he might say that the business was progressing in a solid and satisfactory manner. He did not know that it was necessary for him to add anything more; and he would now move the adoption of the report and accounts.

Mr. NEWTON seconded the motion.

Mr. GROVER inquired whether the Board had had their attention attracted to the use of gas-engines for the generation of electricity. He stated, as a matter of interest to the shareholders, that, on the occasion of a recent visit to Amsterdam, he had, by the kindness of the Association's Manager resident there, been admitted to view the works, and was very greatly impressed by their beauty and the perfection to which they had been brought.

Mr. SNOWDEN inquired if there was any reserve fund.

The CHAIRMAN: Oh, yes.

Mr. SNOWDEN: Are we to understand that the dividend now recommended is being paid out of revenue, without trenching on the reserve fund?

The CHAIRMAN said the Association, since he had been a Director of it, and he believed for long before, would never have thought of declaring a dividend if it had not been fully earned. There could be no question of that, nor need there be any uneasiness on the subject.

Mr. SNOWDEN said he was not uneasy. He merely thought it proper that the matter should be clearly understood, because he gathered that gas companies had declared dividends that had not been earned.

The CHAIRMAN said he did not know anything about that. All he could say was that the Association did not do so. With regard to the observations of Mr. Grover, he might say that the Association did supply gas for the purpose of producing the necessary power for electric light. They did anything that was reasonable to induce people who wanted electric light to obtain it by means of gas-engines. All these things were perfectly well known to gas engineers; and there was no difficulty about it. All gas companies had to indulge, more or less, in touting; and the Association had to do a little also. But gas was of such value for many purposes—for heating and cooking, and, as suggested, for producing the electric light—that there could be no doubt as to there being

a very considerable field for enlargement; and he could assure the gentleman who spoke on the subject that nothing was being neglected by the Association to extend its use. He was very glad to find shareholders inspecting their works. It was the desire of the Board that proprietors who happened to be in any town lighted by the Association should call upon the engineer and ask to be shown over the works.

The motion was then put and carried unanimously.

The CHAIRMAN next moved that a dividend of 5 per cent. for the half year ending the 30th of June last, and a bonus of 1 per cent., be declared upon the £3,800,000 of stock of the Association; and that the same be payable, free of income-tax, on and after the 1st of December next.

This motion having also been carried unanimously,

Mr. R. COOPER moved, and Mr. W. MORTER seconded, a vote of thanks to the Chairman and Directors; and it was carried unanimously.

The CHAIRMAN said he was much obliged for the confidence which the proprietors always showed in the Directors. He would like, before they parted, to ask them to give a cordial vote of thanks to their officers. Those officers did their duty to the Association, while the Deputy-Chairman and Directors and himself on their part endeavoured to encourage them in its performance, by going constantly to the Continent to look after the proprietors' interests. The Association was, he thought, well served, both in England and abroad.

Mr. PALMER seconded the motion, and it was carried unanimously.

The proceedings then terminated.

AUSTRALASIAN GAS ASSOCIATION, LIMITED.

The Annual Meeting of this Association was held last Friday, at St. Clement's House, Clement's Lane, E.C.—Mr. HENRY L. HAMMACK, J.P., D.L., in the chair.

The SECRETARY (Mr. G. J. Gray) read the notice convening the meeting; and it was agreed to take as read the report and accounts, some particulars from which were given in the JOURNAL last week.

The CHAIRMAN, having mentioned that the Manager of the Company (Mr. G. Swinburne) was present at the meeting, and would be pleased to give the shareholders any information they required with reference to their affairs in Australia, said it was a source of gratification to the Directors that, at this the third annual meeting, they were able to recommend the declaration of a dividend of 7 per cent., the same as was paid on the previous occasion. They had also the satisfaction of knowing that, unlike many other ventures, they had sound properties in good situations, and built on the most approved principles. With regard to the working of the Company during the year, they brought forward a balance of £247, and had made a profit of £3771—making together £4018. They had paid away as interest on loans and debentures and interim dividend £2512, which left a sum of £1506. The profits of the year would have been larger, but the Charters Towers Gas Company, in which they held a considerable interest, instead of paying a dividend (which in their own case would have amounted to £160), had used the profits in enlarging their works. These extensions had been carried out under the superintendence of Mr. J. Chamberlain; and Mr. Swinburne's opinion was that they promised next year to be very remunerative, and the Association would then recoup, in the shape of increased dividends, the sum which they expected to have had as interest upon their investment this year, and, moreover, their shares would be more valuable. Reverting to the working of their own concern, he said that the sales of gas, residuals, &c., in 1890 produced £6565; while, during the past year, the amount received was £10,234, which was a very substantial increase. In 1890, the capital expenditure stood at £58,808; while in the present accounts, the figures were £65,827. As to the shares of the Company, they had been taken up very largely in the Colony by gentlemen who had the opportunity of investigating for themselves the security of their investment; and he thought this very circumstance was an assurance that the shareholders in London were enjoying the advantages of a secure investment. He trusted that next year the Board would have the pleasure of putting before the shareholders a still more agreeable statement than the one they submitted on the present occasion; and that they would be able to pay, if not a larger dividend, at all events one of equal amount. He concluded by moving the adoption of the report and accounts.

Mr. G. H. HAYWOOD seconded the motion.

Mr. MACNAMARA asked whether the Company had been affected by the strike in Melbourne, because it seemed to him that, if there had not been a strike, their returns would have been even better than they were; and, if they were now paying less for coal, their prospects for the present year were very good. He also inquired whether, instead of paying away a large sum o money in the form of interest on loans, it would not be more economical to call up a certain amount on the shares, and pay off the loans.

The CHAIRMAN replied that he did not refer to the strike in Melbourne, because strikes were now almost chronic. During the trouble with the coal miners, they had to get their coals where they could. This had affected their profits to the extent of between £400 and £500; but, happily for the Company, the masters and men had the good sense to quickly settle the dispute. With regard to the other matter referred to by Mr. Macnamara, the Chairman said that it was useful to the Board to have a little uncalled capital; so that, when they had occasion to go to their bankers, they had this to offer as security—in other words, it was better to borrow from their bankers at 5 per cent. than call up the balance on the shares.

The motion was carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. S. SPENCER, resolutions were passed, declaring a dividend for the half year ending June 30 last at the rate of 7 per cent. per annum, free of income-tax, and re-electing two of the retiring Directors in Australia (Mr. H. Andrews, jun., and the Hon. Thomas Bent), and also the Auditors (Messrs. Alfred Lass, Wood, and Co.).

A vote of thanks having been passed to the officers and staff of the Company,

Mr. SWINBURNE thanked the shareholders on behalf of himself and his colleagues; and, in the course of further remarks, said that, when he left Australia, the whole of the Company's works were in a very efficient condition, and were working very well. During the past year they had spent a considerable sum in renewing the retorts and putting everything into order; and this had all been paid for out of revenue. The cost of their works compared very favourably with many other Colonial undertakings; and at times they turned out twice and thrice as much gas as works having double the capital. The extensions last year were principally at Box Hill, which was a rapidly growing suburb of Melbourne. There they had erected a new gasholder, and had largely extended the gas-mains. The extensions at the other stations had been chiefly in mains and additional services. Although the consumption of gas was increasing at a very fair speed, there would not be any necessity for additional outlay on the existing works during the current twelve months. In a communication he lately received from Melbourne, a comparison was made of the results of the working during August and the corresponding month of last year; and it showed the very handsome average increase at all the works of 22 per cent. Most gas-works in England were content with getting a 5 per cent. increase; so that if they had in the future a much less rate than 22 per cent., it would be very satisfactory. Speaking of the strike at Melbourne, he mentioned that the price of coal had been up to £4 and £5 per ton; and this entailed a loss to the Company of nearly £500, which had been met out of revenue. This amount, with the dividend from the Charters Towers Company, represented a large deduction from their profits. Before concluding, he stated that they had entered into contracts for coal at 16s. per ton delivered at Melbourne; but all coal contracts in the Colonies now contained a strike clause.

The CHAIRMAN, in answer to Mr. Macnamara, said that the Directors hoped, now that the £10 shares had been divided into two of £5 each, they would get a quotation on the Australian Stock Exchange. In reply to an application for a quotation on the London Stock Exchange, the Board had been informed that they must first issue one-half of the nominal capital (£125,000), so that, when they had completed the present issue of £80,000, they would have £4000 more to issue to bring them within the requirements of the Stock Exchange Committee.

A vote of thanks to the Chairman and Directors terminated the proceedings.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Half-Yearly Meeting of this Company was held on Tuesday last, at the London Offices, 30, Gracechurch Street, E.C.—Mr. ALFRED WILLIAMS in the chair.

The SECRETARY (Mr. Alfred Lass, F.C.A.) read the notice convening the meeting, and it was agreed to take as read the Directors' report and the statement of accounts, a summary of which appeared in the JOURNAL for the 27th ult. (p. 765).

The CHAIRMAN, in moving the adoption of the report and accounts, said he wished to make a few remarks with reference to the position of the Company. No doubt the shareholders would have noticed some alterations in the accounts. They had suffered, as nearly all gas companies had done, through the extra cost of coal; and their rental had also been affected by the right which the Municipal Council possessed of taking off, at any time they liked, 50 public lamps, for the purpose of trying experiments with oil or electric lighting. They had done this; and it had reduced the receipts somewhat, and consequently the profits, but not to such an extent as to prevent the Directors paying the usual dividend. Furthermore, the Municipal Council had given the Company notice that, at the end of the year, they would discontinue their contract for public lighting, reserving their right to take 315 lamps from the total number for the electric light. This would bring down the Company's rental; but, of course, there would be a reduction of the expenses. They had recently entered into a contract for lighting 194 lamps outside the district to be lighted by the Electric Lighting Company at an increased price per 1000 cubic feet. What the result of these changes would be, he could not anticipate; but the Board trusted they would not be detrimental to the position of the Company.

Mr. C. GANDON seconded the motion, which was carried unanimously.

The CHAIRMAN then proposed that a dividend for the half year be declared on the preference shares at the rate of 8 per cent. per annum, and on the ordinary shares at the rate of 7 per cent. per annum, both less income-tax (except upon those dividends payable to the local shareholders.

Captain THURBURN seconded the proposition, which was agreed to.

The CHAIRMAN then moved a vote of thanks to the Secretary (Mr. Lass), the Local Secretary (Mr. F. A. Conyers), the Engineer and Manager (Mr. T. B. Younger), the Auditors (Messrs. R. Berridge and Magnus Ohren), and the Solicitor (Mr. E. K. Blyth). The Chairman remarked that all these gentlemen had rendered the Company good service; and he mentioned that Mr. Younger was present at the meeting, being at home for the benefit of his health.

Mr. LASS and Mr. YOUNGER acknowledged the vote on behalf of themselves and their colleagues.

A similar compliment was paid to the Chairman and Directors; and the proceedings then terminated.

Theft of Gas at Preston.—At Preston last Tuesday, John Matthewson, a tailor, appeared to answer a charge of interfering with a meter of the Preston Gas Company, and another of abstracting gas fraudulently. Robert Martin, one of the inspectors of meters, stated that, on the 28th ult., he found that both the inlet and outlet pipes of the meter had been severed from it, and indiarubber tubing attached to the ends of the pipes, so that the gas used would not be registered. It was stated by Mr. Blackhurst, for the prosecutors, that defendant had been a gas consumer for about twenty-five years. They did not know how long the frauds had been going on. In each case the defendant was fined 40s. and costs, about £5 altogether; in default to be imprisoned one calendar month, with hard labour.

WEST MIDDLESEX WATER-WORKS COMPANY.

The Half-Yearly General Assembly of this Company was held at the Company's Offices, 19, Marylebone Road, on Tuesday last—Sir WILLIAM HENRY WYATT in the chair.

The SECRETARY (Mr. George B. Hall) read the notice calling the meeting; and the report of the Directors and half-yearly statement of accounts were taken as read.

The CHAIRMAN said he might, in the first place, say that the accounts now before the proprietors ought to give them the greatest possible satisfaction. The accounts this half year included some very heavy parliamentary expenses, which he would touch upon presently; and they included also the partial rebuilding of the premises in which they were then assembled, which would come to a considerable amount. Besides this, there was a large instalment towards the payment of a new engine at Hendon. All these expenses they had been able to meet out of current revenue, and still remain only £85 worse in the balance than when they started. He thought this was a very satisfactory statement. There was also brought into account the large sum of £17,000 a year, which the Company gave as a rebate to the consumers. That, of course, was a fund upon which the Company could draw if there should ever be any need to do so; but he did hope there would be no necessity. He now came to the work the Directors had been doing. It had been a very anxious six months for the Board; but they had acted—as he thought, and as he hoped the proprietors would think—wisely in going on providing new works for extensions, just the same as if there had been no agitation to buy the Company up, or anything of the kind. They were providing for the future as far as they could. That kind of expenditure, perhaps, would be limited in time to come by their want of capital, and by their exceeding unwillingness to go to Parliament for more capital, although they might have to do it. At the present time, at all events, they had not allowed that to interfere with them. With regard to the new works, he stated that there was in progress a new filter-bed at Barnes, two new triple expansion Worthington engines at Hammersmith, a new main to Shepherd's Bush Green, and another from Barrow Hill to Kidderpore. The three new steel boilers at Hammersmith came out of revenue, and did not affect the laying out of fresh capital on works. He thought this statement would show that the Company had nothing to be afraid of. The Company were giving a constant supply to the whole of their district. They were obliged to do it, and were willing enough; but he doubted whether the public appreciated it. This put the Company to considerable expense in fixing their fittings, &c.; but as the County Council had given them a legal notice, they were bound to do it. The next thing he adverted to was the heavy expense the Company were put to in opposing Bills in Parliament. That really was a very cruel thing. They arrived at nothing; but it had cost the Company this half year the sum of £3214, and he would not like to say that that was the whole of it. This was a considerable sum to be taxed with, in view of the possibility before them that it might not be the last year they would have to incur parliamentary expenses for the same purpose. He thought the inquiry was a very costly and unsatisfactory one, not only to this Company but to all the Companies. Nothing could be alleged against the Company. It could not be said that the water was impure, or that it was not sufficient in quantity. In fact, the inquiry came to nothing at all. Notwithstanding that, it had lately been held up as a bugbear to the Companies that they would have to lay out so much money to meet future contingencies. This was a shameful thing for those who had said it, because they were perfectly aware that they were not making a statement of the entire facts. They quite forgot to tell the Company that, if they laid out a large sum of money, they would have, in course of time, a very large increase of revenue to pay for it. But supposing, as was just possible, that these works did not pay for a year or two after they were laid down, the Company were in the happy position of having this £17,000 a year now given in rebate to fall back upon if it were required. Therefore he did not think that they need fear. The great thing was that the inquiry took up so much of the time of the Directors and chief officers. They had to be down day after day in the House of Commons—without doing any good. The Committee said they had not heard anything against the Company, and did not want to hear what they had to say. The Company had not been attacked, the Committee said; and it would be quite time to defend themselves when they were attacked. He did not know what they called attacking. All he could say was that it had been a very harassing time for the Directors; but he had hoped they had done fairly well, and that the shareholders would think so. He now came to a matter which he was sure they would all join with him in regretting—viz., the approaching retirement of their good and excellent friend and Secretary, Mr. Hall, who had been for 48 years in the service of the Company, and had passed through almost every department, acquiring a perfect knowledge of each. During all these years, Mr. Hall had never been found fault with, but had been always diligent and intelligent, and had thought of the Company's interests as his own. The Directors suggested that he might hold over his resignation for a time; but Mr. Hall had thought that it would add to his comfort, and probably lengthen his life, if he were allowed to retire. The Board therefore asked the proprietors to grant him a superannuation allowance of £800 a year from Christmas next, when his resignation took effect. The Board had appointed Mr. F. H. Wybroo, the present Assistant Secretary, to succeed Mr. Hall, and Mr. T. H. Barnett to succeed Mr. Wybroo. He then moved that the report of the Directors and the half-yearly statement of accounts be received and entered on the minutes.

Mr. JAMES POMEROY seconded the motion.

The CHAIRMAN, in reply to a question by Mr. Butlin, said the salary of the Secretary was £1200 a year.

Sir RICHARD WYATT inquired whether the Board had seen the report in last night's papers of the proceedings of the Corporation of London on that day. He himself gathered from it that the Corporation had resolved to re-introduce their Bill, leaving out the power of purchase.

The CHAIRMAN said the attention of the Directors had not been specially called to it.

The resolution was adopted unanimously.

The CHAIRMAN then proposed a resolution declaring a dividend on the consolidated stock for the half year of 10 per cent., less income-tax.

Mr. POMEROY seconded the motion, which was adopted.

Resolutions were also passed endorsing the action of the Board with reference to the retirement of Mr. Hall and the changes resulting therefrom.

A vote of thanks to the Chairman and Directors was proposed by Mr. NICHOLAY, and was heartily assented to.

The CHAIRMAN, in reply, said this vote of thanks was particularly grateful to the Board, following as it did upon six months of such anxiety that they often found it difficult to discern what was best to be done. He was sure they would not be without anxiety during the next half year; but perhaps they would get used to it in time.

The proceedings then terminated.

THE LEICESTER CORPORATION AND GAS AND ELECTRIC LIGHTING.

Mr. Lennard on Electric Lighting—The Aylestone Road Gas-Works Extensions.

Last Thursday week, on the invitation of Mr. Lennard, the Chairman of the Leicester Corporation Gas Committee, the members of the Town Council, and a large number of other gentlemen, assembled at the Aylestone Road Gas-Works to inspect them, and to receive from Mr. Lennard some information respecting electric lighting, and the position of the Corporation in relation thereto. About an hour and a half was occupied by those present in investigating the vast works (some large extensions at which have just been completed), and all appeared deeply interested in everything that was to be seen. Afterwards the company adjourned to the reading-room to partake of tea; but before it was served, Mr. Lennard addressed his visitors. He said that he had invited them there because the Town Council were now about at the end of their responsibility. They had had the duty cast upon them of spending a great deal of the ratepayers' money on the works, and of carrying them on for the benefit of the town. He thought it was only right that the retiring Council, and the candidates for election on the new Council, should have the opportunity of seeing what work had to be done. Having shortly explained the history and the great success of the gas-works, he went on to speak of the position in which the town stood with regard to the electric light. Until 1886 no progress was made with electric lighting, and then the industry was hampered by an Act of Parliament limiting the monopoly to 21 years. In 1888, however, this period was extended to 42 years. The Leicester Corporation were then again overwhelmed with the applications of companies anxious to supply electricity. They again thought it desirable to obtain powers; but when they applied for the Order, they expected better terms than they actually obtained, for the Swansea Corporation had just been given the right to charge 1s. per unit. Their Order, however, only allowed them to charge a maximum of 8d. a unit. In nine months from now, they must put this Order into operation, or they might be charged with following the dog-in-the-manger principle. They did not intend to act in this way; but now they had to face the difficulty of deciding what to do with the Order. There was no doubt in his mind that there would be a good demand for the light, as the standard of comfort was rising in all classes. Since 1888, 70 Provisional Orders had been granted for supplying the electric light; and 46 of these had been granted to Corporations. In London, 17 companies had obtained powers for supplying the light; and one company had powers for the City. It was remarkable that only one local body in the whole of London had ventured to apply for powers for the inhabitants; and that was the Vestry of St. Pancras. The experiment of this body was very similar to that which Leicester was about to make. He proceeded to refer to what had been done at Bradford, Barnet, Taunton, Eastbourne, and in London. At Bradford there had been a net loss on the two years' working of the electric lighting installation of more than £2000. The only electric lighting company which he could find had realized a dividend was the St. James and Pall Mall Company, which paid 5 per cent. He had read many essays, papers, and books on the question; and the impression which one received from reading in these papers the articles of enthusiastic electricians was that there was nothing easier than to make profits by supplying electric light. But between their hopes and estimates and hard facts, there was a large difference. He had studied both sides of the question, and desired to deal with it from an impartial point of view, with the aim of arriving at the truth; for they must not rush into any rash experiments and lose £50,000. The first question to be asked was what was the prospect of custom? This would depend very much upon the price. The maximum they were allowed to charge was 8d. a unit. The general opinion of engineers was that the electric light would cost three times as much for lighting purposes, and six times as much for heating. At this price most of the tradesmen in the centre of the town would probably use the light; and the residents in Stoneygate would also no doubt wish to be served. If they only had to supply these districts, they could probably make the undertaking pay; but unfortunately six inhabitants in any district could also demand to be supplied, and, having obtained the Order, the Corporation could not have the benefits unless they accepted the responsibilities incurred. The question that next presented itself to his mind was what was the best method they could adopt to produce the electricity and obtain a profit. In the old Council it had been urged by some that, rather than make a muddle of the scheme, they should hand it over to a company. He was not of this opinion. In carrying out the electric lighting themselves, they would be able to borrow money at a less rate of interest than private companies; and they would have less expense, less rent, less cost of distribution, and less cost for collection. They had a good staff in the Gas Department, perfectly well organized, which could undertake these duties. Working much in this way, all the electric light and gas companies in America invariably paid. It seemed to him therefore that, if electric lighting could be made to pay, they ought to set about taking advantage of the Order at once. The principal question they had to determine, however, was [which was the best mode of generating electricity. He was afraid they could not make the concern pay if

they generated the electricity by the aid of steam; and he should be prepared to recommend the Corporation to adopt gas-engines. The merit of gas was that it cost less than fuel, less for distribution, less for plant, and less for labour. At present they proposed to have stations in various parts of the town, and not distribute the power from any station over a radius of more than a quarter of a mile. Should the Corporation think it advisable to carry out the Order, a Committee would formulate a plan as to where the stations should be placed; and the winter of 1892 should see a good deal of electric lighting in the town. He was not afraid that the interests of the Gas Department would be damaged. When the electric light had been developed, it would be the best light given; but there would still be room for gas, and he looked forward to the day when both departments—gas and electric lighting—would advantageously minister to the comforts of Leicester.

The Mayor and Aldermen Wright and Wood also spoke, and thanked Mr. Lennard, on behalf of those present, for his address. The company afterwards sat down to tea. At intervals during the proceedings, the Gas Department band played a selection of music.

Each of the visitors to the works received a little book, which had been compiled by Mr. Lennard, embracing the history of the old Gas Company from its earliest days, together with a cursory sketch of the process of gas manufacture. The following is an epitome of its contents: The Leicester Gas Company, it states, was incorporated in the year 1821. The capital raised was £12,000; but the Company obtained powers to increase it to £16,000, and, by consent of Quarter Sessions, to £24,000. The town was first lighted with gas on Oct. 30, 1821, so that last Thursday week was the 70th anniversary of the lighting of the first gas-lamp in Leicester. The price charged for gas was then 14s. per 1000 cubic feet. The consumption during the first twelve months was 1,945,000 cubic feet; the greatest number of retorts in use during the first winter being 20. The capacity of the two original gas-holders was 12,600 and 13,000 cubic feet respectively. The early days of the Company were anything but prosperous. The works were leased by Mr. C. B. Robinson. The first dividend was paid on Jan. 5, 1824, for the half year ending Christmas, 1823, at the rate of 6 per cent. per annum; and from that time until the transfer to the Corporation in 1878, the maximum dividends allowed by the various Acts of Parliament were always paid. The lease of 1823 was renewed to one or other members of the Robinson family, until the Company came under the operation of the Gas-Works Clauses Act. The earliest record of the number of men employed is dated Christmas, 1841, when there were 21, whose average wages were 17s. per week. Last Christmas, at the works only, there were 472 men employed; the average wages being 30s. per week, or an increase of 76 per cent. The total number of employees throughout the department at the same date was 608. The undertaking was transferred to the Corporation on July 1, 1878, since which time three reductions in the price of gas have been made. At the time of the transfer, the capital account of the Company stood at £220,000, for which the Corporation gave £476,651 12s. 6d., and £4000 for distribution among the officials. The profits realized by the Corporation during the 13 years they have owned the works amount to £309,696; being an average of £23,822 per annum. Of this sum £207,570, or an average of £16,605 per annum for 12½ years, has been paid in relief of the general district rates. To the sinking fund has been paid £47,154, to the reserve fund £5000, and to the works renewal fund £35,000—leaving a balance of £12,174 to be disposed of at the end of the present financial year. In connection with the undertaking are two gas-works—the old works in Belgrave Gate and the new works in the Aylestone Road. The former works, although in excellent condition and thoroughly efficient, are placed at a great disadvantage in having no railway communication. Leicester was, until the year 1879, supplied with gas from the Belgrave Gate works only. The productive capacity of these works—under 3,000,000 cubic feet per day, with a storeage of only 2,000,000 cubic feet—becoming insufficient for meeting the increasing consumption, the Leicester Gas Company, in 1875, purchased 32 acres of land near the village of Aylestone and adjoining the Leicester and Burton branch of the Midland Railway Company, upon which to erect new works. In March, 1878, the foundation-stone was laid for new works, from designs prepared by Mr. C. S. Robinson, together with his brother, the late Mr. G. A. Robinson, in conjunction with a local firm of architects, Messrs. Shenton and Baker. Shortly after this date, the gas undertaking was purchased by the Corporation. By the end of 1882, when Mr. Robinson resigned his post, works had been completed to produce 1,000,000 cubic feet per day, with 1,500,000 feet storeage. Workmen's dwellings, superintendents' houses, offices, and a clock tower had also been erected. From this time the further extension of the works has been carried out by the present Engineer, Mr. Alfred Colson. In the years 1884 and 1885, the productive capacity of the works was increased to nearly 3,000,000 cubic feet per day, at an outlay of £35,000. Four years ago, a further extension of the gas-works having become necessary, it was decided to erect a second section, equal throughout to about 4,000,000 cubic feet per day. About £110,000 has already been spent upon this section, which at the present time has a productive capacity of 2,000,000 cubic feet per day. For a further expenditure of £40,000, the section can be completed—*i.e.*, made equal to 4,000,000 cubic feet per day. When this is done and a slight addition made to No. 1 section, the daily productive capacity of the Aylestone Road works will be equal to 7,000,000 cubic feet of gas per day, which quantity represents 700 tons of coal carbonized every twenty-four hours. In 1885-86 residuals works were erected in the south-west corner of the land adjoining the gas-works, and abutting on the river and canal. These works deal with the whole of the tar and ammoniacal liquor produced at the two gas-works. They cover about 3½ acres of land, and will shortly be capable of manufacturing 100 tons of sulphate of ammonia per week, and of distilling above 100,000 gallons of tar. The total cost of the works, including the extensions now being carried out, amounts to about £25,000. In no town in the kingdom have gas-cooking stoves become more popular than in Leicester. The number of stoves on hire at the present time is nearly 3500; and the quantity of gas consumed by these and the private stoves amounts to at least 64,000,000 cubic feet per annum. The total population of the area of supply by the gas undertaking is 180,000; and the present number of consumers, 24,053

THE GAS QUESTION IN THE SALFORD OUT-DISTRICTS.

At a Special Meeting yesterday week of the Swinton and Pendlebury Local Board, the Chairman (Mr. W. H. Lomax) moved a resolution to the effect that the Board, either separately or jointly with the Barton and Eccles Local Board, promote a Bill in the ensuing session of Parliament for the purchase of the portion of the gas undertaking of the Salford Corporation within the two Boards' districts and the other out-districts supplied by Salford, with the exception of Prestwich, and empowering the Board to construct gas-works and incur the charges incidental thereto. Mr. Pollitt inquired what would be the cost of the land, works, and gas-mains. Mr. Hampson said the Committee had entered into a provisional arrangement for the purchase of about 3½ acres of land, at a cost of £500 per acre; and this, together with the cost of the works, would bring the estimated cost to between £600 and £700 per million cubic feet of gas. With regard to the cost of the mains proposed to be purchased from the Salford Corporation, and the compensation for the loss of the profits derived by them, that would have to be determined by arbitration. So far as the Committee knew, from £600 to £700 per million cubic feet would cover everything. Mr. Lysons stated that the estimated consumption within the district was 50 million cubic feet; so that the total outlay would be about £35,000. Mr. Gerrard said, taking this expenditure into account, he had calculated that they could serve their own district with gas considerably cheaper than it was at present supplied by Salford. Last year he had estimated from the report of the Salford Gas Committee that gas was manufactured by them at less than 1s. 9d. per 1000 cubic feet, while the consumers within their district and other out-districts were charged 2s. 8d. He could assure the members that they could supply gas at 2s. per 1000 cubic feet; including the cost of the outlay. Several other members spoke; some of them expressing the opinion that it would be wise to proceed with the Bill, even if it was thought expedient afterwards to approach the Salford Corporation for better terms of supply, because then they would be better armed. The resolution was seconded and carried, with only one dissentient.

On the same day, a meeting of the Eccles Local Board was held, at which a resolution authorizing the Board to obtain parliamentary powers for supplying the district with gas, jointly or separately with the Swinton and Pendlebury Local Board, was moved by Mr. Spary, and seconded by Mr. Mellor. Mr. Parr opposed it on the ground that the resolution of the ratepayers did not empower the Board to proceed with a Bill, but to get the differential rate charged by Salford abolished. After further discussion, a division was taken, when six voted for the resolution, and four against it.

On Tuesday, a public meeting of owners and ratepayers (called by the Chairman of the Eccles Local Board in pursuance of a requisition from the ratepayers) was held at the Eccles Town Hall for the purpose of giving their consent to the promotion of the proposed Bill. From a report prepared by the Clerk to the Local Board (Mr. Trenbath), it appeared that the number of gas consumers in Eccles and the proposed area of supply was 5600; the annual consumption of gas, 104,246,000 cubic feet; and the number of public street lamps, 1157. As the site of the gas-works, the Board had secured Barton Grange Farm, which consisted of 42 acres of freehold land, and would cost £6000. The major portion of this farm would be used for sewage irrigation purposes. Mr. W. D. Kendall, the Chairman of the Board, in his opening remarks, said it was urged by some that they had been hasty in the promotion of the Bill; but he must remind the ratepayers that the abolition of the differential rate had been before them for years. The Local Board were obliged to go on with the Bill, because there was a limit of two years in which the Board could avail themselves of the opportunity given them in the Salford Provisional Order to erect their own gas-works. They had also an agreement with the Swinton and Pendlebury Local Board to proceed with the Bill; and if they did not go on with it, Swinton would promote a Bill and would probably include Eccles in the area of supply. Mr. Chadderton remarked that the Salford Gas Committee had never been approached by the Local Board either as to the reduction of the differential rate or a reduction in the price of gas; and the whole study of Salford was to reduce the price of gas and to meet Eccles on a fair basis. Mr. Burton said that the Gas Engineer who had advised the Board told them they could erect complete gas-works, with all the newest appliances, to manufacture 120 million cubic feet of gas, for £25,000. The Board were not entitled to ask Salford the amount of compensation to be paid for their mains until they had deposited the Bill; but if new mains had to be put down in the district, the cost would be £16,390, in the Barton Rural Sanitary Authority's district £19,200, and in the Little Hulton Local Board's district £3279—a total of £38,869. Mr. Roper objected to the Board proceeding with a half-prepared scheme in next session of Parliament, and leaving it as a heritage to be dealt with by the new Town Council. Mr. Hibbert submitted a resolution passed by the Monton Ratepayers' Association, protesting against the Board taking upon themselves the responsibility of promoting a Bill without the consent of the ratepayers, and requesting that the proposal be deferred until the election of the new Town Council. Mr. Alderman Bowes observed that there was a desire on the part of the Salford Gas Committee to meet Eccles; and since the advent of the new *régime*, Salford had reduced the price of gas 9d. per 1000 cubic feet. Mr. Spary warned the meeting that, in anticipation of an adverse vote being given that evening, the Swinton Board had altered their notices so that they could apply for power to supply the whole of the out-districts of Salford. The Chairman put the resolution that the Board proceed with the Bill; and it was defeated by a large majority. Mr. Ward, on behalf of 6000 ratepayers not present at the meeting, demanded a poll.

Boughton Water Supply.—At the last meeting of the Faversham Union Rural Sanitary Authority, a scheme which has been propounded by Messrs. Stevenson and Burstal for the water supply of Boughton and Staple Street was under consideration. It is proposed to pump the water from a field adjacent to the gas-works; and the estimated cost of the scheme is £3608. The Authority resolved that steps should be taken to carry out the work.

HEYWOOD CORPORATION GAS-WORKS.

An Agreement with the Stokers—Increase in the Consumption of Gas.

From the minutes submitted by the Gas Committee at the last meeting of the Heywood Town Council, it appeared that on the 26th ult. they granted an audience to representatives of the gas stokers and the Secretary of their Union, in reference to conditions of working, &c.; and, after due consideration, the following terms were agreed upon: "(1) That eight-hour shifts be worked as far as possible by the stokers. (2) That stokers be paid 5s. per shift. (3) That foremen stokers work twelve-hour shifts, and be paid 40s. per week of seven days therefor. (4) That time-and-a-half be paid for work on Sundays between 6 a.m. and 10 p.m. (5) That double time be paid for work on Christmas Day and Good Friday. (6) That the Manager be at liberty to stop all the men, or any number of the men on Sundays, in case there is not sufficient storeage for gas. When part only of the men are so stopped, the Sunday employment on those occasions shall be given to the men in turn. (7) That the ordinary weight of coal to be carbonized per shift be 2 tons 2 cwt. per man, and that 1½d. per cwt. be paid for all coal carbonized per man over that weight. (8) That full wages be paid to each man who, whilst engaged in actual work, may be required to carbonize less than 2 tons 2 cwt. per shift. (9) That eight days' holiday per man be granted during the summer months to each stoker (including foremen stokers) who shall have been continuously employed as such by the Corporation for twelve calendar months immediately preceding such holiday. A stoker whilst on such holiday to receive labourer's wages only. (10) That all men in the employ of the Committee shall give or receive seven days' notice before leaving such employment; but the Committee retain full power to summarily dismiss any man for neglect of duty or misbehaviour, &c."

In moving the adoption of the Gas Committee's minutes, Mr. Lawton gave some figures showing the actual consumption of gas in the past quarter, as compared with the corresponding period of last year. There was consumed in shops and cottages during the quarter 6,007,800 cubic feet, as against 5,543,267 feet, or an increase of 564,533 feet; by public lamps, 608,349 feet, against 507,978 feet, or an increase of 100,371 feet; in mills and workshops, 828,500 feet, against 549,300 feet, or an increase of 279,200 feet; for stoves and motive power, 958,250 feet, against 746,500 feet, or an increase of 211,750 feet; additional supplies, 70,250 feet, against 52,500 feet, or an increase of 17,750 feet. The total consumption therefore amounted to 8,473,149 feet, against 7,399,545 feet, being an increase of 1,073,604 feet, or 14½ per cent.; and this the Committee considered very satisfactory. Alderman Firth seconded the motion, which was carried.

EXTENSIONS AT THE JOHNSTONE CORPORATION GAS-WORKS.

The demand for gas in the town of Johnstone, in Renfrewshire, about nine or ten miles from Glasgow, has in the course of the past few years outgrown the supplying power of the gas-works, which were taken over by the municipal authorities in 1878, under the provisions of the Burghs Gas Supply (Scotland) Act, 1876; and on Thursday last an important extension of the works was completed and officially taken over by the Gas Commissioners of the burgh. A new gasholder is the principal feature of the extensions; and its inauguration brought together a large number of the townspeople—including all the Burgh Commissioners, Mr. G. L. Houstoun, the Superior of the town, and no fewer than five ex-Provosts of the burgh. The holder was constructed from the plans and to the specifications of Mr. J. M'Gilchrist, of Dumbarton, the Consulting Engineer to the Commissioners; and it was erected by Messrs. R. Laidlaw and Son, of Glasgow. It is 88 feet in diameter and 20 feet in height; provision being made for it being telescoped by the addition of an outer lift 90 feet in diameter, in the event of this being wanted. There is likewise a new station meter, which has been supplied by Messrs. J. Milne and Son, of Edinburgh. It is capable of registering 15,000 cubic feet per hour. The tank for the holder was constructed by Messrs. Black and Eadie, of Paisley and Johnstone. After the party had assembled, Mr. M'Gilchrist requested Provost Armour to turn on the gas from the new holder into the town. The Provost complied, and then proceeded to give some particulars as to the gas undertaking. He said the burgh of Johnstone in 1878 acquired the gas-works from the local Gas Company for rather more than £22,000. At that time the total storeage capacity was 76,000 cubic feet; and the price charged to the consumers was 5s. 5d. per 1000 feet. Since that time the burgh, besides paying off £6050, had reduced the price by 1s. 5½d.; so that it was now 3s. 11½d. The Commissioners had also made considerable additions to the works; the largest being the new holder, which was capable of containing 125,000 cubic feet of gas. This brought the total storeage capacity up to 201,000 cubic feet. They had also put in a new station meter, equal to registering 15,000 cubic feet per hour, in place of the old one registering 3500 cubic feet. The consumption of gas in a town was a good indication of its prosperity or otherwise; and he had much pleasure in informing the company that during the last month they had an increase of 300,000 cubic feet, as compared with the corresponding month of last year. He further stated that the probable cost of the holder, tank, station meter, &c.—£4500—would not be exceeded. A vote of thanks having been passed to the Provost, the proceedings at the gas-works concluded. Subsequently the company met at dinner in the Council Chamber—Provost Armour presiding, and the Convener of the Gas Committee, ex-Bailie Thomson, discharging the duties of the vice-chair. After the loyal and patriotic toasts had been proposed and duly honoured, Provost Armour submitted the toast of "Success to the New Gasholder," which was enthusiastically received. Mr. M'Gilchrist then, on behalf of the contractors, presented to the Chairman and Vice-Chairman the pair of handsome bronze statues which were upon the table, as a slight memento of the work just completed, and of the part they had taken in making it a success. The gifts having been suitably acknowledged, other toasts followed, and a pleasant evening was spent.

THE TECHNOLOGICAL EXAMINATIONS OF THE CITY AND GUILDS OF LONDON INSTITUTE.

We have received from the Superintendent of the Technological Examinations of the City and Guilds of London Institute (Sir P. Magnus) a copy of the report on the examinations conducted by the Institute in April and May. We find therefrom that the total number of worked papers was 7416, as compared with 6781 in 1890; showing an increase of 635—the corresponding increase in the two previous years being 175 and 440. This year there was not only an increase in the number, but also in the proportion of candidates who satisfied the Examiners; the passes being 4099, as against 3507 in 1890, and the percentages of passes 55·3 as against 51·8. The number of worked papers does not correspond exactly, although it does very nearly, with the number of candidates, as some of them present themselves in several branches of a subject. This year the number of individual candidates was 7322, against 6667 in 1890, and 6448 in 1889; and of the first-named number, 4056 succeeded in passing—an increase of 600 on the number who passed in 1890. There was a fall in the general percentage of failures from 48·2 to 44·7; and while the total increase of passes was 592—the largest number reached since the examinations were established—the additional failures were only 43. In the Ordinary Grade, the increase in passes is 117 in the first, and 422 in the second division, while there were only 3 additional failures. Of the 4099 successful papers, 2846 were the work of new candidates. Last year the corresponding number was 2331; while in 1889 it was 2528. Of the entire number of papers examined, 1253 were those of candidates who had previously passed; and of these, 715 succeeded in obtaining a better place. Last year, out of 1176 papers of former candidates, 737 were successful in entering a higher grade. This falling off is regarded as the most unsatisfactory feature of this year's examinations. Of the 1253 candidates who presented themselves this year for re-examination, 583 failed to rise; whereas the number last year was 439. With regard to the subjects in which our readers are specially interested, 43 candidates submitted themselves for examination in Gas Manufacture. Of this number, 3 passed in the first class, 9 in the second class, and 2 failed, in the Honours Grade; 6 passed in the first class, 10 in the second class, and 13 failed, in the Ordinary Grade. Consequently, 28 passed and 15 failed—the proportion of failures being 34·9 per cent. In Coal Tar Products there were 16 candidates, only 6 of whom satisfied the Examiner, and these were in the Ordinary Grade. In Fuel there were 14 candidates, of whom 8 passed—3 in the Honours, and 5 in the Ordinary Grade. Of the latter, 4 passed in the first class. In Electric Lighting there were 392 candidates, of whom 6 passed in the first class, 24 in the second class, and 45 failed in the Honours Grade; and 88 passed in the first class, 134 in the second class, and 85 failed in the Ordinary Grade. There were 262 passes and 130 failures; being 33·1 per cent. In Gas Manufacture there were 5, and in Electric Lighting 136 additional candidates. This year there were four subjects added to the list; and the examinations were conducted at 245, as against 219 different centres throughout the country, as well as in the colonies. By the liberality of several of the Livery Companies of London, the Institute has been enabled to award this year, as the results of the examinations, the sum of £325 in money prizes. The total number of prizes given was 192, consisting of 75 silver and 81 bronze medals, in addition to the money prizes of the Livery Companies, amounting to £219 15s. It will be seen from the foregoing particulars that the Institute is carrying on an exceedingly useful work.

THE CORPORATION OF LONDON AND THE WATER QUESTION.

Alliance of the Corporation and the County Council.

At the Meeting of the Court of Common Council of the City of London on Thursday, the 29th ult.—the Lord Mayor (the Right Hon. Joseph Savory) in the chair—the special report of the County Purposes Committee, dealing with the question of the water supply of the Metropolis, the principal portions of which were given in the Journal last week, was presented. It recommended that the necessary steps should be taken for the introduction, in the next session of Parliament, of a Bill for carrying out the objects therein set forth.

Mr. Rose-Innes (Chairman of the Committee), in moving the adoption of the report, expressed regret that the Select Committee to whom the Water Bills of last session were referred did not take more active steps in respect to the Bill presented by the Corporation. In his opinion, the great merit of that Bill was that it struck the right nail on the head in regard to the water question. The initiatory step was that London should have a body possessing the power to go to Parliament on the subject; and such a body was contemplated in their Bill last year. If that portion of the proposed measure had been approved, the Corporation would have been twelve months in advance. Commenting upon the merits of the Bill, he quoted extracts from the opinions expressed on various occasions by members of the London County Council. As to any second Bill that was introduced, Parliament would only give the necessary powers where a purchase clause was included. Without such clause, the water question was insolvable. The question of an alternative supply could not be mooted in any way whatever until a Bill had been drafted containing clauses as to purchase. The Committee had done their best to bring the matter clearly and satisfactorily before the Court; and as a conference was to be held on the following day between the Corporation and the County Council, he sincerely hoped the Court would adopt the report, and at some future time they would be able to bring forward a Bill that would meet with the satisfaction of the inhabitants of the Metropolis at large.

Mr. Hollington moved, as an amendment, that the reception of the report should be adjourned for a fortnight; contending that it did not carry out the solution of the question on the lines originally intended. He did not think it would be in the interests of the Court that the question should be prematurely dealt with, especially in view of the

conference that was to take place between the two bodies. He could tell the Court that the report was not in accordance with the wishes of the London County Council in its present shape; in fact, he might go further and say that its adoption might be regarded as a breach of faith by the members of that body. It left out entirely the question of a new supply, and did not mention anything about preliminary inquiries as to what they were going to purchase. After referring to the great increase which had taken place since 1870 in the consumption of water by the inhabitants of the Metropolis, he said that in four years the sources of supply now possessed by the Companies might be exhausted. The Government did not intend that the water undertakings should be purchased at a price which was not a fair one; and it was for this reason that he considered it to be unwise that the Court should adopt the report without the most careful consideration.

Mr. CLARKE complained that there was no principle laid down upon which the proposed tribunal could base their inquiries. As had been suggested in the report, the machinery for bringing about what was wanted might be the Lands Clauses Consolidation Acts; but he doubted very much whether the County Council would consider this a just proposal in a question of such magnitude. Referring to the principle of arbitration, he pointed out that the arbitrator would simply take the average profits realized by the Water Companies and capitalize them. He contended that this would be unfair between one Company and another, because there were some Companies who had supplemented their supply. On the subject of purchase, he said the County Council were bound by their resolution, which was very clear—viz., that the price of the undertakings should depend not upon the payment of dividends or upon Stock Exchange valuation, but upon the condition of the property and its future wants. He expressed himself very pleased at the "marriage," so to speak, which had taken place between the Corporation and the County Council, as he thought they stood very little chance of doing good if these two bodies did not agree to work together in attempting to solve the difficulty of the water supply.

Mr. HICKS said he could not agree with the Committee. He considered the Bill promoted by them last year was an admirable solution of the difficulty; but the Parliamentary Committee, although they threw out the Bills introduced, made several recommendations, one of which was that powers should be given to the County Council to expend such sums as might be considered reasonable in solving the difficulty, and, further, that that body should be regarded as the responsible municipal authority of London. He was no friend of the County Council; neither did he like the way in which they had conducted their affairs. But he was bound to confess that a more business-like and statesmanlike report than the one issued by that body on the question of the water supply he never wished to read. The report of the County Purposes Committee, he considered weak—weak in the extreme, and not worthy of the Corporation. Proceeding to criticize the results of the conferences which had taken place between the two bodies, he said he thought the Corporation had the worst of it. He denied the right of the County Council to make the Corporation the "cat's paw" with which to pull the chestnuts out of the fire; and he asked why they should be expected to pay the costs of these Bills. The Corporation would have to pay the expenses if the Bill were unsuccessful; and, if successful, the County Council would get all the credit. He thought, therefore, that the Corporation would do well to keep aloof; and if they wished to bring in a Bill on the question of the water supply, they should deal with the City only.

Mr. HORA, referring to the suggestion that the Corporation should bring in a Bill for the City alone, said he knew this would be denounced by the inhabitants as a most selfish action.

Mr. MALTHOUSE said he considered that, if the report was adopted, the Corporation would be departing from an agreement made between them and the County Council. The great mistake in the proposed Bill was that of compulsory purchase. The County Council Bill was based upon two points—viz., purchase and a new supply. If the Water Companies refused to take a fair and reasonable price, an independent supply could be obtained at one-fourth of the cost. The question was one which could only be based upon fair and reasonable terms; but he urged that the proposed measure was identical with that brought in by the Vestries, opposed by the Corporation, and rejected by the Parliamentary Committee. Mr. Malthouse then went on to refer to the success which had attended the artesian well sunk in the City, and said he believed, if the Corporation sank several of these wells, they might do without the Water Companies altogether.

Mr. MORTON opposed the report, and alleged that in it the Chairman of the Committee had apparently been inclined to mislead the Court. He asked what the cost of the new measure would be, because it seemed to him that the Court had no idea of the amount involved. He was told that up to the present time the Court had expended £5000 over the water question; and he objected strongly to any attempt to buy up the water undertakings. On the contrary, he thought the Corporation should confine their efforts to seeking to relieve the citizens of London from the excessive water charges.

Mr. SLY supported the report, and said he could not believe that honourable members were serious in their suggestions that the Corporation should bring in a Water Bill for the City alone. He was opposed to the proposition that the Corporation should take a back place to the County Council, who, in the first instance, came to the Court; and personally he believed the Council would be glad if the proposed notice were given.

An ineffectual attempt was then made to adjourn the debate. After some remarks by Mr. Rose-Innes and other speakers, the adjournment of the Court was moved; but the proposition was defeated. Subsequently a division was taken on a motion to adjourn the debate; with the result that a majority of 23 were against it. Mr. Bridgeman then, amid much shouting, moved the adjournment of the Court; but again the members refused to agree to it. Eventually, however, a motion to adjourn till the following Monday was passed with unanimity.

The debate was resumed at a Special Meeting of the Court held on the 2nd inst.—the LORD MAYOR again presiding.

The TOWN CLERK (Sir J. Monckton) said that, since the adjournment of the debate, a conference had taken place between the County Purposes Committee and a deputation from the County Council; and, as the result, another report was to be brought before the Court. He then proceeded to read the report, which stated that a specially-appointed deputation of the Committee received in conference a deputation from the London County Council, consisting of the Chairman and Deputy-Chairman of the Council, the Chairman and Vice-Chairman of the Special Committee on Water Supply and Markets, Mr. Dickinson, and Mr. A. R. Binnie, their Engineer. The question was frankly discussed between the deputation, actuated as they were by one common desire to serve the interests of the Metropolis and the urgency of action. The proceedings of the last session of Parliament were reviewed, and opinions freely exchanged on the all-important question of the course to be pursued; and thereon the deputation of the County Council stated that they were unable to agree to the recommendations of the report of the Committee of the Common Council as a whole, which was now before the Court. They expressed their very earnest desire to continue to work in co-operation with the Corporation; and suggested the re-introduction of the agreed Bill of last session. Under these circumstances, the deputation of the Committee of the Common Council withdrew from the conference to discuss the position. After full consideration and advice from their officers, they came to the following resolution: "That, having heard the views of the deputation of the London County Council, that the agreed Bill of last year should be re-introduced, this deputation are prepared to recommend the adoption of that course." This decision was at once communicated to the deputation; and it was with satisfaction that the Committee were able to report the unreserved concurrence of the County Council deputation in this course of action. The Committee submitted the recommendation for adoption, with the further one that they should be authorized to take the necessary steps for the re-introduction of the Bill.

Mr. ROSE-INNES, in moving the adoption of the report, said the Bill of last session was drawn up on a basis accepted by the Corporation and the County Council, and provided for the appointment of a Statutory Water Committee of the two bodies who should have power to promote Bills for a new supply of water or the purchase of the existing undertakings, or both; taking a limit of time if forced to do so. The costs of the Act and the administration of the Committee and the promotion of the Bill would fall on the county rate. The supply of water in each district in the Metropolitan water area outside the County of London would be, as far as practicable, in the hands of the local authority of each district, and within the county of London in the hands of the Statutory Committee, who would have full power over details; but questions of principle and policy would be reserved for the London County Council. The result of the fresh report would be the abandonment of the proposed four years' limit. He would undertake to lay the draft of the Bill on the table of the Court before it was submitted to Parliament; but, meanwhile, it was important that the necessary notices should be at once given. Replying to questions, he stated that the Bill proposed to constitute a Commission to inquire fully into the conditions of the existing supply, and, in view of purchase, to open up negotiations with the present Companies and others, also to prepare a scheme for a fresh supply if it was found desirable or necessary to do so. On the proposed Water Committee, seven-eighths of the members would be appointed by the County Council, and one-eighth by the Corporation. If the Bill passed, the expenses of its promotion would come from the county rate; if it failed, the cost would be borne by the Corporation, as the County Council had no power to promote Bills.

Mr. HICKS said the Court were asked to embark on a course which was fraught with peril to the Corporation and the Corporation's finance. The County Council were not able to pay the expenses of promoting the proposed Bill. What was the position of the Corporation in this matter? He held very strongly that it was not a dignified one at all. They had been in the habit of taking the lead in public affairs and improvements of the whole Metropolis; and if there were not a County Council in existence, he should say this was a question for the Corporation to take up and carry through. The Select Committee had deliberately accorded all procedure to the County Council, and not to the County Council and Corporation conjointly. It was now proposed that the Corporation should have representation, in the proportion of one to seven, on the Committee of the County Council. Was that a dignified position for the Corporation? The promotion of the Bill meant an enormous expenditure on counsel, engineers, accountants, and various other officials; and if the Bill failed in the first onset, the Corporation would have to pay the expenses. Was that fair? The Corporation had already spent on the water question the sum of £7136, and what had they received for it? Up to the present, absolutely nothing. What had the citizens of London to complain of? They did not complain of the quality of the water they received, or of the quantity, but they did complain, and very justly, of the charges they were bound to pay. If they went to Parliament with a Bill with regard to the charge for water, they would have everything in their favour. He moved the following amendment: "That the report do lie on the table, and that it be referred to the County Purposes Committee, on behalf of the Corporation, to give notice of opposition to any Water Bill that may be introduced to Parliament, in order that such Bill or Bills may be amended in the interests of the ratepayers and water consumers; and that they be instructed to inquire and report as to the desirability of prosecuting a Bill in Parliament for the purpose of placing the water-rates in the City upon a more just and equitable basis than they are at present."

Major JOSEPH seconded the amendment.

Mr. A. A. WOOD said the wisest course for the Court to adopt was to accept the report of the Committee. They ought to have the matter settled. If they could not include in the Bill all the points they would like to see there, they ought to be satisfied to get something towards the settlement of the matter.

Mr. BEDFORD said the London County Council were ten times more interested in the water question than the small area of the City of London. He thought there was not the slightest chance of the Bill passing. He was in favour of the Government appointing a Commission of experts to inquire into the whole subject of the water supply.

Mr. ROSE-INNES having briefly replied on the discussion, the amendment was put and lost. The original motion was thereupon put and declared, amidst loud applause, to be carried.

The discussion then ended.

THE ASSESSMENT OF THE BARNSTAPLE WATER-WORKS.

In the JOURNAL for Aug. 11 last, we briefly reported certain proceedings at the Barnstaple Quarter Sessions in connection with an appeal made by the Barnstaple Water Company against the assessment of their property. The rateable value was £500; and this had been raised to £900 by the Assessment Committee. The case was heard by the Recorder (Sir G. Sherstone Baker, Bart.), who was accompanied by the Mayor (Mr. R. Lake).

The case for the appellants, as presented to the Bench by their representative (Mr. J. A. Thorne), was as follows: The undertaking was originally founded in 1698. It was not, however, until 1858 that the first Act of Parliament was obtained; and to that Act the Company owes its existence. In 1888, by virtue of another Act, the Company had enlarged powers conferred upon them. They constructed a new reservoir, carried out extensive alterations, lengthened their mains, and made other arrangements for the purpose of increasing the water supply of the town. The works were not increased in value as rateable hereditaments until these hereditaments began to make some return; and that was a result which had not taken place to any appreciable extent. The works lay in different parishes; but only those in the rate-books of the parish of Barnstaple had to be dealt with. In 1871 the rateable value of the works in Barnstaple was £133; in 1876 it was raised to £220; in 1879, reduced to £219; in 1887, before the passing of the new Act, it was raised to £500; and in 1889 again raised from £500 to £900. This was a very considerable change; and the Company had been unable to find out any circumstances which had warranted the increase. Having consulted Mr. T. Hawksley on the subject, they discovered that they were very much overrated; and they determined to appeal against the rating, having failed to get relief before the Assessment Committee. The total rating in all the various parishes in 1886 was £30 15s.; in 1889 it was £642 5s.; and in 1890 it was £1162 5s. But the increase was attributed to what had been done in Barnstaple. In 1862 there had been expended upon capital account £11,179; in 1873, £70 was spent; in 1874, £1218; in 1887, £2244; and in 1888, £13,019. What they had to do was to find out what a hypothetical tenant would give. The total amount the Company had received since the passing of the Act of 1888 was £22 in respect of the new works carried out under that Act; and yet the rateable value had been raised from £500 to £900. Not a single shareholder of the Company had had a penny more since the passing of the new Act. Mr. Thorne then explained the process by which the rating was arrived at, and the method of apportioning it among the respective parishes. He said the apportionment was made on the principle that as the amount laid out in one parish was to the whole, so was the rateable value of that parish to the whole rateable value. On behalf of the respondents, the principle on which the rateable value was ascertained was accepted, although the figures were disputed. With regard to the principle of apportionment, this was opposed altogether. Evidence was called in support of the contentions of the respective parties. Mr. Hawksley, for the Company, put the value of the works in Barnstaple at £389; Mr. W. Sturge, of Bristol, on the same side, at £442. For the Assessment Committee, Mr. Mason (of Messrs. Hedley, Mason, and Hedley, of Birmingham) calculated the real rateable value at £952; and Mr. T. Dinwiddy, at £1035. At the close of the evidence, the Recorder said he would take time to consider his decision, as several important points were involved.

Judgment in the case has since been delivered, and it is in the Company's favour. Having explained the nature of the appeal, and the method by which, following the principle laid down in the Mile End Old Town case, he had arrived at the total rateable value of the Company's property in the four parishes, the Recorder said he found the Company's annual gross receipts to be £2949, and the annual rateable value of the property in Barnstaple £600; and he should accordingly amend the rate to this amount (a reduction of £300). He also made an order upon the respondents for £10 10s. costs.

DUBLIN CORPORATION WATER SUPPLY.

Proposed New Pipe-Line.

At the Meeting of the Municipal Council of Dublin on Monday last week—the LORD MAYOR (the Right Hon. Joseph Meade) presiding—the *agenda* paper contained the following resolution: "That the Water-Works Committee be authorized and directed to take all necessary steps for procuring a Provisional Order or Act of Parliament to enable the Corporation to acquire land, obtain loans, and do all other necessary matters for providing and laying a second line of pipes from Callowhill to Stillorgan; and that the Town Clerk be authorized and directed to affix the city seal to all papers and documents when so required by the Water-Works Committee."

Mr. O'MEARA, the Chairman of the Water Committee, in moving the adoption of the Committee's report on the subject, said the matter of laying this second line of pipes had been before the Corporation from time to time since 1881. It had, however, been postponed on each occasion; the financial position of the Corporation being such as to prevent them undertaking the work. Notwithstanding the large sums of money which had been spent on various improvements, the Corporation were now in a better financial position; and he trusted they would once and for all attack and dispose of this question. There was an absolute necessity for carrying out the work. The action of the Vartry water on the pipes had created an incrustation of oxide of iron; the result being that the volume and pressure of water was reduced to very much less than when the pipes were first laid. He had in his possession a pipe which was taken up from the neighbourhood of Brunswick Street about a month ago; and it was completely choked with oxide of iron. If this was the result of oxidation on the mains supplying the entire city and suburbs, he was afraid Dublin would some day be in a bad state. If they had a second line of pipes, they would be able to clean out the original line, and thus get a greater pressure, and save themselves from the consequence of a burst of the pipes, which frequently happened in these districts on account of the immense pressure of water. The Engineer had estimated that this work, if taken in its entirety, would cost £100,000. The Committee did not propose that the whole of the work should be at once undertaken. All they were asking at present was that the cost of it should be taken out in short loans. This year they wanted a loan of £10,000.

Mr. WALKER seconded the motion.

Mr. DOYLE opposed the motion, and argued that, if the present pipes were taken up in sections, and the oxidation cut out, it would be all that was required.

Alderman GILL did not think that such a large city as Dublin should be left at the mercy of one set of pipes, when it had been proved that the service was not sufficient to supply the water needed.

The HIGH SHERIFF said this was not merely a question of £340 a year added to the rates, as had been stated in the papers; but it meant a loan of £110,000 sterling. They would have to apply for an Act of Parliament to obtain power to go through other peoples' property with this line of pipes; and they might be opposed. Then, there was also the question of compensation to owners of property; but the report was absolutely silent on these two very important matters. A report which omitted such important subjects was not satisfactory; and there were other points on which information was desirable. He therefore moved, as an amendment, that the report be referred to a Special Committee to make full inquiry into the subject, and especially as to the modes of conveying water from the impounding to the distributing reservoirs adopted in the principal cities of the United Kingdom.

Alderman SEXTON seconded the amendment.

After further discussion,

Alderman DILLON asked the High Sheriff to add to his proposition the following words: "And that the Committee be authorized to take all necessary steps to secure that the scheme which may be ultimately approved of shall be carried out without loss of time."

Mr. M'QUAID suggested that the matter should be left to the Committee, to sit as often as necessary, and to report to the Council on the 23rd inst. as to the steps to be taken.

The HIGH SHERIFF agreed to accept these additions; and the amendment was ultimately agreed to.

THE ELEMENT OF DETERIORATION IN WATER-WORKS.

A Commission of the Supreme Court of Syracuse (U.S.A.) was recently held to determine the value of the plant of the Syracuse Water Company; and in the course of the proceedings, the question of the element of deterioration in water-works plant came prominently forward. An American contemporary (*Fire and Water*) has made the following remarks on this matter:—

It is, of course, admitted by engineers that deterioration, as a factor, exists, and should be recognized in all calculations as to the value of any mechanical device and structure. The question, however, as to what shall be the measure of deterioration is determined by conditions and circumstances so variable in character as to preclude the possibility of establishing a fixed rule or factor in order to institute a basis of calculation applicable to all cases. It would appear, from the facts submitted in the case of the Syracuse Water Company, that no judgment can be fairly and intelligently rendered in any case without first instituting a rigid examination and investigation of all the material forms of construction of every character employed in the work, and the influences that have been active in producing the deterioration.

Commencing with reservoirs, their structural characteristics are perhaps more enduring than any others connected with water-works. In the case of earth embankments and masonry, properly constructed in obedience to engineering rules and practice, and also kept in repair, deterioration at any period of their existence will be recognized as a small factor. Pumps and boilers are the most active machinery. It is generally accepted as expert authority that the average life of them is 15 years, assuming that they are in constant service. Yet in many cases they are known to have given greater length of time of service. In this case the amount of work performed by the machinery, consistent with its range of power, is very often ignored; and, as a result, the life-period of duration is very much abridged. Constructive features of mechanics, as applied to pumps and boilers, are important factors in calculations of their deterioration. In the case of gate-valves, constructive features and material used largely determine the value of these important parts of the plant. It may be said in the case of fire hydrants and gate-valves that, if these are constructed of the best material and located secure from the effects of frost, the factor of deterioration in estimating their value will be small.

In the field of water-works experience, there appears to be considerable diversity of opinion upon the question of the duration period of cast-iron pipe. Since its introduction for use as a water conveyance, the term of its average life has not been recorded in any authoritative work upon the subject. Cast-iron water-pipe has been in use for upwards of 50 years in the United States. Quality of the iron, method of casting, and the coating process are associated with its ability to perform its work on the side of constructiveness.

The quality of water in various water-works sensibly affects iron pipe relatively, and according to the degree of hardness or softness of the water. The use of the coating process on cast-iron pipe has no doubt prolonged its life. The character of the soil or earth in which the pipe is laid affects its durability. However, it is very evident that, in the case of cast-iron pipe, each particular sum of experience must be considered in connection with what is here stated. Hardly two cases are exactly alike. In Europe deterioration of iron pipe has been based upon the fact of the pipe choking or filling up with deposit. The question of disintegration due to oxidation has thus far been of such variable conditions in prominent instances and to such a degree as to forbid a positive statement as to the measure of deterioration. In several cases the diminution of flow occasioned by tubercular deposits formed the basis of calculations of value; the question of the integrity of the material as to strength not being considered.

In the case of water-meters, though active agents (equal in activity to that of pumps), the evidence of deterioration is variable, and, in effect, based upon circumstances of location and defective construction rather

than upon the test of the durability of the parts in actual motion. The portability of the meter of recent origin gives the opportunity to test it for accuracy, also to test its train of gearing for durability. In some instances, meters have been tested for durability by running continuously, night and day, for months; embracing a period of time equal to many years of actual use, and without producing any appreciable evidence of deterioration in their working parts.

Grouping all of these several branches, belonging to water-works construction, it can be said of them in relation to deterioration, that its effect upon the durability period of the materials used in the plant is vitally affected by the character of the material, the construction of it, the care of it, the locality, as affected by the conditions of temperature, and, finally, the skill of the engineer or superintendent in charge of the administration of the works.

THE SELF-PURIFICATION OF RIVERS.

In the JOURNAL for the 20th ult., reference was made to a paper read by Professor VON PETTENKOFER on the above subject, at the annual Congress of German Naturalists and Medical Men recently held at Halle. In view of the position occupied by the Professor, and the interest attaching to the question dealt with by him, we reproduce, from the *Chemical News*, the following abstract translation of the paper:—

The immediate purpose of the communication was to inquire whether the sewage of Munich could be safely allowed to flow without treatment into the River Iser. Water is said to be polluted when it is no longer clear and inodorous, when fishes and plants perish in it, and when it contains more organic matter and less oxygen than are to be found in the unpolluted portions of its flow. Such contamination is essentially different from the transient turbidity due to heavy rains or to melting snow. Still, even the permanent pollutions disappear in the further course of the river bed, not merely by deposition, but by other agencies to be discussed later on. Here the rapidity of the stream and the quality of the water exert, as is well known, a preponderating effect.

The most formidable impurities are considered to be the putrescent refuse which flows out of the sewers, and which very quickly produces an offensive odour at the places where it accumulates. In this respect very peculiar prepossessions have been developed. Human excretions are regarded as more dangerous than those of the lower animals; the overflow of cesspools is pronounced less objectionable than the discharge from water-closets; and urine is declared less formidable than solid excrement. It is difficult to estimate the impurities which the sewage contains in the form of commercial and industrial refuse, which play a very important part. According to the Saxony Board of Health, the river pollution due to industrial refuse is 93 per cent., as against only 7 per cent. arising from sewage properly so-called. Professor Von Pettenkofer has for many years given his attention to this question, and has continually had researches conducted by his pupils. But nothing has hitherto altered the opinion he expressed long ago, that sewage may, without hesitation, be permitted to flow into a river, if its volume is not more than 1-15th that of the river water, and its rate of flow decidedly greater than that of the current. Nevertheless, most German local authorities prohibit in every case the introduction of crude sewage into a river. The speaker encountered no little hostility, as he expressed an opinion opposed to this practice for the waste waters of the city of Munich. To come to a decision on the question, we must take the circumstances of the case into exact consideration. Munich numbers at present 280,000 inhabitants, who void daily 20,440 kilos. of putrescent organic matter, which in the course of a year gives the very large total of 7,458,000 kilos. If at first these figures startle us, the picture changes as soon as we take into account the volume of water flowing in the Isar. According to accurate observations, this river discharges 40 cubic metres of water per second, or 3,456,000 cubic metres daily. If the quantity of pollution is weighed against this figure, the former is only 6 milligrammes per litre. This pollution is so inconsiderable that it cannot be detected by the eye if a corresponding mixture is made up experimentally. But it is also not permanent; for at Ismaning, 7 kilometres below Munich, the sewage influx is no longer to be detected, although now more than half the closets have been connected with the sewers. Still less is sewage matter to be detected bacteriologically or chemically at Freising, 33 kilometres below Munich. On Jan. 21 of the present year, samples of water were drawn from the Isar, both above Munich and Freising. The former contained per litre 243 milligrammes of solid residue; the second, 252 milligrammes. The former required for oxidation 1·4 milligrammes of oxygen, and the latter 1·6 milligrammes. These differences are so small that they fall within the limits of experimental error. This summer, specimens were taken on June 18, July 22, and Aug. 2, which gave on evaporation a mean residue of 197 milligrammes per litre, and required for oxidation 2·3 milligrammes of oxygen. The circumstance that in winter the organic matter is one-half lower, and the inorganic matter higher than in summer, is explained by the affluents which feed the Isar. The melting snows and the heavy rains increase the organic matter in a manner easy to be understood.

The bacteriological researches conducted by Prausnitz equally prove the purifying power of the Isar. The number of 198,000 bacteria per cubic centimetre found at the mouth of the Munich sewer was reduced at Ismaning to 15,231, and at Freising to 3602 bacteria. These results agree with those of other investigators. Fränkel found in the water of the Spree above and below Berlin 6000 bacteria per cubic centimetre; but in the city, 1,000,000. The mere number of bacteria has, however, no sanitary significance, since the bacteria found in the water are almost exclusively harmless, and, indeed, destroy the pathogenic microbia in the struggle for existence. In fact, if we accept the apparently untrustworthy statements of some French investigators, pathogeneous bacteria have hitherto never yet been found in river water. If they were present, and, in spite of the enormous dilution, were able to produce infectious diseases, this would have become manifest by statistical facts. It might have been assumed formerly when Munich was a notorious nest of typhus fever, that this was the cause of the cases which appeared in the towns situated lower down the Isar. But Munich has been almost freed from typhus by sanitary improvements; while the above-mentioned smaller towns in the Isar Valley which have not amended their hygienic arrangements are still as abundant in typhus cases as they were in times when it was attempted to blame Munich for the infection. If the self-purifying power of the Isar is thus demonstrated, the question arises, How is it effected? This has been repeatedly ascribed to subsidence; but nothing save Isar gravel has ever been found by dredging below Munich.

Professor Von Pettenkofer ascribes the purifying action of rivers solely to the oxygen dissolved in the water in a free state, or separated from organisms. In the latter respect, the green algæ and other chlorophyllic or even non-chlorophyllic plants come prominently into consideration. It is therefore urgently requisite to preserve this vegetation, which may be destroyed by a too great concentration of the water to be purified; just as a field may be damaged by overmanuring. To this end the oxygen in the water, which is absorbed by the plants and given off again, must be present in sufficient quantity. On the other hand, industrial waste waters which destroy aquatic vegetation must not find entrance into the river unless previously purified. What part is played by oxygen may be observed in aquaria, where the sea water does not need to be renewed for months if the air is passed through. The water remains clear, although it receives the excretion of the animals present, and many residues of their food. But it is at once rendered turbid by bacteria if the supply of air ceases.

On account of the clearly demonstrated self-purification of the Isar, Von Pettenkofer declines to take upon himself to delay or complicate the domestic drainage and sewage of Munich, so important from a sanitary point of view, by the demand for irrigation fields, which is not easy to fulfil. He leaves to the future the installation of such fields, the use of which he does not deny, but the management of which should not be imposed upon the towns, but left to the agriculturists. He concluded his paper amidst general applause with the recommendation that the self-purifying power of rivers should be closely examined in as many places as possible.

Electric Lighting for Finchley.—An exhaustive report has been submitted to the Finchley Local Board upon the lighting of their district by electricity, by their Engineer and Surveyor, Mr. F. Smythe. He recommends the adoption of the transformer system, with an alternating current. The cost of the installation he estimates at £17,000. At a meeting of the Board on the 27th ult., it was resolved that an application should be made to the Board of Trade for a Provisional Order to carry out the scheme.

The Clerkenwell Vestry and the Cost of the Metropolis Water Supply Bill.—At the meeting of the Clerkenwell Vestry last Thursday, a report was received from the Executive Committee of Vestries and District Boards on the London Water Supply, relating to the promotion of the Metropolis Water Supply Bill, showing a deficiency of £1392 13s. 4d. to be raised towards the cost thereof, and inviting the Vestry to contribute to make up the deficiency. Mr. J. F. Kelly moved that the Committee should be informed that the Vestry declined to do as requested; and the motion was carried.

Gas Exhibition at Walthamstow.—During four days of the past week, a successful exhibition of gas cooking, lighting, and warming apparatus has been held by the Lea Bridge District Gas Company at the Victoria Hall, Walthamstow. Very interesting lectures on cooking by gas were delivered twice daily by Miss Kelman; and they appeared to be highly appreciated by large audiences each day. Messrs. T. Fletcher and Co. had on show a large number of their high-class gas-cooking ranges, with the latest improvements. They also made a splendid display with their gas-fires and other apparatus. Messrs. W. Sugg and Co. exhibited a number of their well-known high-class lights, both for domestic and other uses. One side of the hall was brilliantly illuminated by them; and they also had two of their powerful lamps fixed outside the hall. Messrs. T. Glover and Co. exhibited a working model of a gas-works and some dry meters in glass cases. Messrs. Burt, Boulton, and Hayward had on show some good specimens of different tar products. All the arrangements were ably carried out by Mr. W. Thorman, the Gas Company's Manager.

The London County Council and the Water Question.—At the meeting of the London County Council last Tuesday, the Special Committee on Water Supply and Markets reported that they were in communication with the Corporation of the City and with the County Councils of the Home Counties on the water question; and, at the Committee's request, the Chairman of the Council has addressed a letter to Lord Salisbury, asking for a reply to his letter of Dec. 12, 1890, in which the Government were asked to institute an inquiry whether the present sources of supply of water are adequate in quantity and quality to the growing demands of the population, and whether any steps should be taken to provide a better supply. On the reception of the report, Mr. Benn asked the Chairman of the Committee (Sir T. Farrer) whether he could give the Council any information as to their present relationship with the City on the water question, and whether any reply had been received from the Government. Sir T. Farrer said: With reference to the connection with the City, I have the satisfaction of stating that, after the communication between a deputation from the Water Committee and one from the County Purposes Committee of the Corporation, the City agreed entirely with our proposals. In other words, what they agreed to was that the Bill that we jointly introduce should be a Bill framed on the lines of the agreement between the City and the Council last summer, and of which the Council is already aware. And I will mention that there is no provision whatever for purchase by arbitration or for any purchase compulsory by this Council, or the City, or the proposed Water Committee. With regard to the application to the Government, I have also the satisfaction of stating that a reply has been received by the Chairman from Lord Salisbury, stating that the Government have the subject of the water supply under their very serious consideration.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The municipal elections are over; and the result to the gas industry in my district will not be much either one way or another. In Leith, Mr. Wells, of whom I wrote so much last week, has lost his seat in the Town Council, which seems to indicate that the ratepayers do not hold his efforts to improve the Gas Commission in the high esteem which he is desirous should be placed upon them. Mr. Wells, though out of the Town Council, has yet a year's tenure of office in the Gas Commission; and he will now have leisure to bestow all his energies on the work of reforming the Commission. In Aberdeen, I am glad to say Mr. Pratt has been thrown out. I have no innate dislike to Mr. Pratt; but he has been such a failure that most people will, I think, agree that it was time he should be compulsorily retired. He got his seat in the Town Council and on the Gas Committee in consequence of his discoveries of what he considered to be wrongs in the Corporation gas undertaking; but during his three years of office, he has not succeeded in altering anything. What tells more against him is that several times he has endeavoured to stir up in the community feelings of enmity to the Gas Department. His last fracas with Mr. Smith, was the worst of all; and it was probably the thing which, more than anything else, was the cause of his being turned out of the Council. It is a satisfaction to know that the electors of a community can appreciate good work and reward it, but that, on the other hand, the man who does not attend to their real interests will sooner or later get his dismissal.

In the re-construction of the Dundee Gas Commission, the Chamber of Commerce met yesterday and appointed their representatives on the Commission. Mr. W. R. H. Valentine asked if there was any prospect of the gas being restored to its former quality? In his own business last year the gas bill had increased very considerably, and he had only a very few more burners. Mr. Henry Robertson replied that the quality of the gas supplied during the past six months had been 25·26 candles. Mr. Valentine said that it used to be 27-candle power. Mr. Robertson explained that the calculation made at 3s. 8d. per 1000 cubic feet they considered very close; and they could not produce gas of greater illuminating power at that price. If the community wanted to have more light, they would have to increase their number of burners, or pay a higher price for the gas.

The Dundee Gas Commissioners have resolved to insure portions of their gas-works to the amount of £23,000, which is about double that hitherto insured. The contingent fund of the Commission, out of which the cost of repairs after disaster might be met, is very small—amounting to only about £45—which may account for the increase of the insurance. As the value of the works and plant is about £260,000, the sum insured is by no means large.

The appointment of an Analyst by the Dundee Gas Commission has not been long in producing fruit in the shape of correspondence with the contractors. At a meeting of the Commission on Wednesday, a minute was submitted which stated that correspondence had taken place between the Clerk and the contractors for coal to the gas-works, on the subject of the coal not having, on analysis, come up to the illuminating power stated in the contract. The Convener of the Finance Committee remarked that the coal in dispute had not been paid for. One can fancy the wink of satisfaction which he gave as he uttered this remark. Whether the Commissioners, having taken delivery of the coal and used it, can now object to pay the agreed price on any ground, will entirely depend on the contract they have made. If they have no provision in their contract entitling them to deduct a proportion corresponding to the deficiency of illuminating power, I am afraid they will have to pay the full price. Their only remedy would be to decline to take any more of the coal, and terminate the contract, which they have it in their power to do if the coal is not up to the agreed-on standard. The difficulty is that, before they can know that the coal is deficient in illuminating power, they must have taken delivery of it. To decline to take more coal because the previous delivery was not satisfactory, might expose the Commission to an action for damages; because the coal tendered might be up to the required standard. Of course, it is open to the Commissioners to contract for coal on a sort of sliding scale, payment being so much for coal which will produce gas of a certain illuminating power, with a reduction in price if the product should fall below that illuminating power. But I have not learned that this is the agreement which the Dundee Gas Commission have entered into with their coal contractors. Indeed such an arrangement would be scarcely workable, as it would be always open to the contractor to say that the test, whether practical or laboratory, was not properly applied, and endless disputes and litigation would ensue. If an Analyst were employed to test the coal merely for the purpose of guiding the Commissioners in future contracts, the office might serve some good purpose; but the benefit to be derived from an analyst on that footing would not rise higher than might be got from the Manager's practical results in the working of the coal. It therefore looks as if the appointment of an Analyst in connection with a gas-works is a redundancy, unless the Manager be an incapable—which, I am certain not even the most ardent supporter of the appointment in Dundee would say that Mr. M'Crae is. In order to carry out the function of analyst properly, the test should be applied to the coal before it is despatched from the colliery; and I leave it to your readers to decide for themselves how such an arrangement could be worked, and what its cost would be. If the purchaser insisted on an analyst at the pit head, the colliery-owner would do the same; and how, in that event, would the price of the coal be affected?

The shareholders of the Tain Gas Company yesterday resolved to accept the offer of the Town Council of 30s. per share for their undertaking. The shareholders of the Company number 26; and the capital consists of 493 shares of £4 each. The price realized is only £839 10s.; so that there is a loss to the shareholders of £1132 10s. The deficit is, however, more apparent than real, as the Company paid high dividends until a few years ago. Of the shares issued, the burgh hold 140; and deducting the price of these, the cash outlay which the burgh incurs in taking over the gas undertaking is only £629 10s. This is certainly a very cheap figure at which to acquire a gas-works; but it has to be borne in mind that the plant has been in use since 1839, and that therefore most of it requires renewal, which will entail further outlay.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

The municipal elections, which are now over for another year, have brought about some interesting changes in the *personnel* of several of the Town Councils and Police Commissions in this part of the kingdom. In this city, no fewer than three members of the Corporation Gas Committee who were seeking re-election have been rejected by the ratepayers; and strange to say, they were the only outgoing members of the Town Council who were subjected to much criticism. In one case it was the "public-house" question that came between the candidate and the electors; and the opposing and successful candidate was run on what was called the "teetotal ticket." The rejected candidate was ex-Bailie M'Laren, who over a long series of years was a most zealous and efficient member of the Gas Committee, and has the subject of gas finance at his finger-ends. As may be remembered by readers of these "Notes," the ex-Bailie (and now ex-Councillor) was long the Convener of the Finance Sub-Committee of the Glasgow Gas Trust; and he took an interest in the duties of his convenership that was quite remarkable. Dr. Archibald Neilson, another of the rejected members of the Gas Committee, had been three years in the Council; and at a former period he was a member for, I think, two triennial terms. A year ago, when the electors rejected Councillor Meehan, Dr. Neilson was elected to be that gentleman's successor in the convenership of the Committee on Gas Stoves and Meter-Repairing Departments of the Gas Trust; and during the twelvemonth that he served in that capacity, he certainly spent much effort and active interest in the performance of the duties devolving upon him. The other member of the Gas Committee who has been dismissed by the electors is Mr. Hugh S. Thomson, who devoted much time and ability to the affairs of the Gas Committee, and was sometimes a keen critic of proposals that were brought forward by the "inner circle." The most important member of the Gas Committee—practically its Chairman—Mr. William Ure, has been returned to the Council without any opposition. He has long been the Convener of the Works Sub-Committee; and in that capacity he has been a most useful servant of the citizens at large, as well as for the East-End Ward which he specially represents.

As regards the new Councillors—three from each of the nine wards forming the suburbs which have just been annexed to the city—many of them will doubtless turn out to be valuable additions to the Local Parliament; but in this connection I would only speak specially of two of them. In view of the great work devolving on the Gas and Water Committees, each of which is to have one representative from each of the twenty-seven wards, I feel confident that Major Cassels, of Ward XXI., and Mr. James M. Thomson, of Ward XXIII., will be able to bring much ability and technical knowledge to the aid of their colleagues if they are appointed, respectively, to the Gas Committee and the Water Committee. Mr. John Cassels, who now lives in retirement from business responsibilities, was for some fourteen years with Messrs. R. Laidlaw and Son, whose connection with gas engineering goes back to an early part of the century. For the next ten years he was a partner in a somewhat allied branch of manufacturing industry. He has plenty of time at his disposal, which he is willing to devote to the welfare of his native city. Mr. James M. Thomson, who is also now living in retirement from business, is a thorough-bred mechanical engineer, and belongs to a family whose business interests have long been most intimately and extensively identified with the progress of this great community. I have no hesitation in saying that Mr. Thomson, if made a member of the Corporation Water Committee, will prove to be one of the most valuable additions made to it at this important epoch in the history of the city.

Going a little further from home, I make a "Note" of what has been done at this time by the Town Council of Paisley. The chief magisterial chair in the burgh having become vacant by the retirement of Provost Johnstone, ex-Bailie and ex-Treasurer M'Gown was, with one consent, elected Provost of the Town at the Council meeting held yesterday. He was long a most valued member of the Gas Committee; and for a considerable period the Convener of that department of the Corporation work. He had (and still has) an excellent grip of the gas affairs of the town, to which he devoted much of his time as a servant of the ratepayers. Mr. Hislop, the Gas Manager, never had a more intelligent or sympathetic chief than the gentleman who is now Provost of the burgh. In his professional capacity as a public accountant, he has for a number of years been the auditor of the gas accounts for the neighbouring burgh of Johnstone.

The ancient burgh of Stirling was at this November election in the same position as Paisley—in need of a Provost—owing to the retirement of Provost Yellowlees, a much-valued public servant. His successor is Bailie Kinross, who had to undergo a contested election in order to have the opportunity of being nominated for the honourable post of Chief Magistrate. His election yesterday to that post by his colleagues has some interest from a "gas industry" standpoint. A local paper of to-day says: "Of the Councillors re-elected, Bailie Kinross stands in the most gratifying position; and his return cannot be regarded in any other light than as a genuine display of the public respect and confidence. The obloquy and misrepresentation showered upon him by his opponents, in connection with his relation to the Gas Company [of which he is a simple shareholder] would have warranted the Bailie in putting forth extreme efforts to retain his seat; but he took no steps to confound his enemies. He left it to the electors to say whether they believed in him or his traducers; and the verdict has been no uncertain one."

There has been, perhaps, a little more firmness in the Glasgow pig iron market this week, so far as Scotch warrants have been concerned; and prices at which there were buyers offering for them fluctuated between 47s. and 47s. 9½d. per ton, the market closing yesterday afternoon at 47s. 9d. cash buyers. In hematite and Cleveland warrants, a large amount of business has been done at slightly lower prices. After touching 49s. 1½d. per ton, the price of hematite declined to 48s. 7d., at

which it stood at the close yesterday. Cleveland iron touched 39s. 1½d. per ton cash; and then it declined to 38s. 9½d. per ton cash buyers. A considerable amount of difficulty has been experienced this week in getting warrants for the few lots of Scotch iron which fell due; and up to 50s. cash was paid on Thursday in London on Glasgow account, it is said.

In the Glasgow coal trade this week the tendency has been to ease, with sellers more inclined to do business. The shipping trade, however, does not show any falling off. The delay caused by the recent stormy weather has now been overcome. Indeed, the only drawback at present is the lack of waggons; and coalmasters are asking themselves the question whether more rolling stock will be available so soon as the railway agreement is finally adjusted. The Baltic demand is falling away with the advent of the winter months, while the hardening in Mediterranean freights has caused less activity for these ports. It is believed that the Baltic ports will be open for a few weeks longer this season, as the weather continues so unusually mild. A favourable factor has been the increased demand for public works; dross moving off better, at 3d. per ton advance. Main sorts have eased a little; 8s. per ton being the current quotation. House coal has been more difficult to cash, the mild weather and the too rapid rise in the price five weeks ago keeping buyers aloof. Splint was given at 9s. 3d. per ton; and steam at 10s. to 10s. 6d.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 7.

Sulphate of Ammonia.—The market is slightly weaker; but this should not be taken absolutely as an indication of a further declining tendency. The early days of a month are so frequently chosen by speculative operators to depress values, that the present *mise en scène* should not disconcert makers, although naturally some of the latter are beginning to look at the situation with feelings of apprehension. The consumptive demand is slow; but the dealers are in want of parcels. Values can, however, hardly improve while they remain the sole buyers. Business is now reported at £10 8s. 9d. f.o.b. Hull; at £10 7s. 6d. f.o.b. Liverpool; and at £10 6s. 3d. to £10 5s. at Leith; while it is rumoured that £10 16s. 3d. has been accepted for Spring delivery. Nitrate meanwhile is getting stronger; and 9s. 5d. is now the lowest spot price.

LONDON, *Nov.* 7.

Tar Products.—It is thought that benzol, which has continually drooped for the last four months, has touched the bottom. Buyers are now becoming anxious for next year's supply; and though prices have not improved, there is undoubted firmness. It is not expected, however, that prices will rise to the extent they did this time last year. The production somehow seems to have increased, notwithstanding the larger quantities which gas managers are able to extract from the tar into the gas. Anthracene is no worse; but buyers do not respond readily to offers. There is some inquiry for naphthalene; and in the present dull condition of the creosote market, makers would do well to separate it. Pitch shows no sign of relapsing, as was prognosticated by dealers would happen when the bigger make came on. Carbolic acid is worse than dull; but solvent naphtha is in better request, at improving rates. Business has been noted during the week at the following prices: Tar, 21s. to 23s. 6d. Pitch, 33s. to 34s. 6d. Benzol, 90's, 3s. 3d.; 50's, 2s. 1½d. Toluol, 1s. 4½d. Solvent naphtha, 1s. 4½d. Crude naphtha, 1s. 1d. Creosote, 1⅞d. Carbolic crystals, 5d.; crude, 60's, 1s. 1½d. Cresol, 7½d. Anthracene, "A" quality, 1s. 2d.; "B," 10d.

Sulphate of Ammonia.—This market is somewhat steadier; and considerable quantities have changed hands. Prices at present range from £10 7s. to £10 10s., less 3¼ per cent. There is a good deal of inquiry for forward business; and no doubt £11 could be obtained. Gas liquor is quoted at 4s. to 5s.

The Electric Light v. Gas in Liverpool.—Messrs. Henochsberg and Ellis, manufacturing clothiers, &c., of Liverpool, have completed the erection of model premises at Islington; and therein Messrs. A. Hall and Co., of Liverpool, have completed one of the largest installations of the electric light in the city. A dynamo having a capacity of 13,000 candles, driven by a 24-horse power Crossley gas-engine, has been put in; but, as is general in the majority of cases, the vagaries of the plant and the uncertainty as to when a breakdown may ensue (although this might, of course, be obviated or remedied by duplicating the dynamos and engine) have led the proprietors to fit up their entire premises with gas; some hundreds of vari-coloured glow lamps, which illuminate the exterior, being supplied solely with gas.

Gas Lighting and Ventilation at the Corn Exchange, Wellingborough.—The Corn Exchange at Wellingborough has recently been altered and enlarged in accordance with the designs of Messrs. Talbot Browne and Fisher, Architects, of that town. The lighting and ventilation of the hall have received special attention; and the scheme ultimately adopted combines a unique and highly-successful installation of regenerative lamps. The plan was furnished by Messrs. Milne, Sons, and Macfie, of No. 60, Holborn Viaduct, E.C., and is a development of the scheme for lighting large interiors suggested by Mr. Macfie in the paper read at the meeting in Edinburgh of the North British Association of Gas Managers in July last (*ante*, p. 257). Two groups, each of five Wenham lamps, consuming in all 200 cubic feet of gas per hour, are employed; each group being fitted to a novel raising and lowering apparatus, manipulated in the loft above the ceiling. The lamp-rims rest on a perforated wrought-iron frame on the ceiling line, with the central lamp in each group some inches lower; exposing only the lamp globes to sight. Over each group a tapered ventilating cone, fixed above the ceiling, receives the products of combustion and the vitiated atmosphere from the hall below, and discharges them into a telescopic ventilating tube, which is in connection with a double-cased induced up-current ventilator of special construction. The result is a brilliantly lighted interior; showing a saving of 50 per cent. in gas, and, after test, a much improved atmosphere, owing to the discharge of the combustion products above the ceiling line, and the efficient exhaust created by the ventilating arrangement.

THE LANCASHIRE GAS COAL TRADE.

From Our Own Correspondent.

Except that house-fire qualities continue in fairly active demand, there is only a quiet tone generally throughout the coal trade of the Lancashire district. Even for the better descriptions, there is no real pressure of orders upon the market; and it is only in exceptional cases where the output is not sufficient to meet the present requirements. Prices are not more than firm at late rates; quotations at the pit's mouth still averaging 12s. 6d. to 13s. for best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and second qualities of Arley, and 9s. to 9s. 6d. for common house-fire coals. The lower descriptions of round coal still hang upon the market, owing to lessening activity in many of the principal coal-using industries; and for iron-making, steam, and general manufacturing purposes there is not more than an indifferent demand. Supplies are plentiful, and there is a competition with surplus quantities coming in from outside districts, which gives a weakness to prices. Colliery proprietors have, in many cases, to give way upon their list rates to effect sales. From 8s. to 8s. 6d. per ton at the pit's mouth represent the full prices obtainable for the better qualities of steam and forge coals. With regard to engine fuel, there is no material change to report, except that the better qualities are moving off perhaps rather more freely for mill consumption. But supplies are largely in excess of requirements; and common sorts continue to be pushed at excessively low figures. Burgy does not average more than 6s. 3d. to 6s. 6d. per ton; the best qualities of slack, 5s. to 5s. 6d.; good ordinary descriptions, 4s. to 4s. 6d.—common sorts being readily obtainable and special lots at from 2s. 6d. to 3s. per ton at the pit's mouth. For shipment there is a fair inquiry; and steam coal is steady, at 9s. 6d to 10s. per ton delivered at the ports on the Mersey.

Northern Coal Trade.—The northern coal trade shows great dulness, as far as the steam coal is concerned; but other classes of coal are steady. For best Northumbrian steam coal 10s. 6d. is now the current quotation, but there are sales, it is said, at prices below that, and there are also deliveries being made on contract at prices that are considerably above. Second-class steam coals are very dull; but small steam, being less plentifully produced, are rather steadier. Gas coals are in very full demand, though the deliveries are somewhat limited for want of more steamships. In consequence of this, the freight for coal to London has advanced to 4s. per ton from the Tyne. The consumption of gas coal is steadily increasing; and the price generally asked is now 9s. 6d. per ton, free on board, for best Durham coal. Bunker coals are rather quiet; and the prices vary a good deal. Manufacturing coal has been weak, because the engineers' strike threw considerable quantities on the market; but it is now steadier, and in a little better demand. Household coal is quiet; the fine weather limiting the consumption. For blast furnace coke, there is a generally good demand; and as the output has been reduced the price appears to be fairly well maintained at from 15s. 6d. to 16s., free on board. Gas coke is now in treaty for next year for some of the cement works, which are large consumers; and the owners seem to expect considerable reductions from the price that has ruled this year. In one case, about 10s. 6d. per ton has been asked for gas coke, for a contract over next year.

The Extension of the Burnley Gas-Works.—The completion of the new retort-house at the Burnley Gas-Works, which has been erected at the cost of £1400, was celebrated a few days ago by an official inspection, followed by a luncheon provided by Alderman Collinge, the Chairman of the Gas Committee. In the course of his remarks on the occasion, he referred to the large sums which were employed yearly by the Gas Department in relief of the rates. He said that something like £80,000 had been handed over, and there was a further amount of £14,000 or £15,000 which had been placed to the reserve fund. When the second retort-house was built, there would be a manufacturing capacity equal to 4 million cubic feet of gas per day; but the speaker added that the present extensions were only part of a scheme which would involve an expenditure of £30,000.

A Large Gasholder for the Blackburn Gas-Works.—Messrs. Clayton, Son, and Co., Limited, of Leeds, are at present engaged in erecting at the Blackburn Gas-Works, under the supervision of the Engineer (Mr. S. R. Ogden), a holder which, when completed, will be the largest in Lancashire. It will be 180 feet in diameter, and there will be four lifts, each 35 feet high; and when the holder is fully inflated, its total height will be 140 feet. The standards are composed of steel and iron, each being 147 feet high. On the top of the standards will be fixed a finial 7 feet in height; making the construction at its loftiest point 154 feet high. The portions of the finial are at present being hoisted by an enormous pair of shear-legs, specially constructed to carry out the work. There will be 19 standards, braced together by four cross wrought-iron girders. The holder will have a capacity of 3,560,000 cubic feet. The estimated cost is £13,500.

Frodsham Water Supply.—Considerable feeling is aroused in Frodsham at the present time with regard to the provision of a water supply to the township, which is very deficient in this respect. Within the past few years, no fewer than fourteen schemes have been propounded; and about £1400 has been expended to no purpose, as they have failed to meet the requirements. The local Parochial Committee have recently adopted a scheme proposed by Messrs. Timmins, of Runcorn. By this it is intended to sink a well on Frodsham Marsh, and pump the water by a gas-engine into a reservoir situated at an elevation high enough to send the water to all parts of the township. The cost is estimated at £3600. The action of the Committee was confirmed by the Rural Sanitary Authority; but, through opposition, the resolution was rescinded. It is contended that the scheme is expensive and incomprehensive, and that it will be cheaper and more advantageous to bring water from the Vyrnwy main at Kingsley, at the price fixed by the Liverpool Corporation of 9d. per 1000 gallons for the first 15,000 gallons and 6d. per 1000 gallons for excess. At present opinion is divided between these two schemes; but a reduction in the price asked by the Liverpool Corporation might exercise much influence on the result.

The Electric Light v. Gas in Cologne.—"It generally happens," says the *Electrical Review*, "that where the electric light is introduced the consumption of gas increases. At Cologne, however, the reverse has proved to be the case. The competition of the electric light has resulted in a diminution in the use of gas in so far as private individuals are concerned. Although during the past financial year the number of private customers to the municipal gas-works augmented, the consumption of gas by such persons decreased by 58,900 cubic metres as compared with the previous year. This is explained by the extension of private electric light plants. The diminution in the use of gas amounted to 13½ per cent. in the case of factories, to 2½ per cent. in warehouses, and to 1·86 per cent. in wholesale establishments and on private premises. The Municipality proposes therefore to reduce the price of gas, especially for cooking and heating purposes; and by this means it is hoped to be able to increase the rate of consumption."

More Electric Light Troubles at Hastings.—We alluded in last Tuesday's JOURNAL to the pranks played by the electric light at Hastings. We have now to record an accident connected with this system of lighting which recently startled some of the inhabitants, but was happily unattended by personal injury. A few evenings ago, people in the vicinity of Robertson Street—an important thoroughfare leading down to the sea-front—were alarmed by a loud report followed by a sudden outburst of flame from the roadway. An examination of the spot showed that the removeable iron lids of two of the electric traps had been violently dislodged, and one was broken into several pieces. The explosions were attributed to an escape of gas into the electric light mains; the gas, it was thought, becoming ignited by the current from the wires. It seems, however, that no leakage of gas has been discovered; and therefore the accident was possibly caused by moisture destroying or weakening the insulation of the electric mains and producing hydrogen gas, which was fired by "over-running." The flames were, of course, caused by the burning of the gutta-percha insulation, and the main was fused. The fire was quickly extinguished; and the only inconvenience resulting from the explosion, beyond the excitement which prevailed, was the temporary extinction of the lamps along the sea-front.

Fatality at the Preston Gas-Works.—A shocking accident, which resulted in the death of a workman, took place at the North Street Gas-Works at Preston, on Monday morning last week. The deceased was only twenty-two years of age; and was employed as a timekeeper by Messrs. Butler and Co., of Stanningly, who have secured the contract for the erection of some pillars and girder roofing in the new buildings now being constructed by the Company. The first lot of girders and pillars having arrived at the works, a number of workmen were engaged on Monday in moving the pieces of ironwork to the required spots. For this purpose a small trolly was used; the wheels being propelled along where necessary by men with crowbars. About half-past nine, a girder was being taken to its place in this manner, and deceased was working at one of the wheels with a crowbar. The girder was standing on its smallest edge; the broad, plated edge being uppermost. Suddenly it fell over; and before the deceased could get out of the way, he was borne down to the earth, the girder resting upon his head. He was frightfully crushed, and was, of course, unconscious. The poor fellow was removed to the infirmary, where he died within a quarter of an hour after his admission. An inquest was held on the body of the deceased on Tuesday, when a verdict of "Accidental death" was returned.

The Fatal Accident at the Coleraine Gas-Works.—The inquest on the body of James Millar, who, as reported in the JOURNAL a fortnight ago, was fatally injured by an explosion at the Coleraine Gas-Works, was commenced on the 24th ult. Abraham Millar, the son of the deceased, was the first witness. It appeared from his evidence that he did not see the accident; but afterwards his father told him he had been connecting some joints in the retort-house at the works, and other men, named Stockman, Mitchell, and Barber, were working at the same place. He finished his job, and went to Mitchell, who was putting on a "thumb." The light being bad, Mitchell struck a match to see if the packing was right, when the explosion took place. Doctors Caldwell and Creery, who examined Millar after the accident, deposed that they found he was suffering from a severe fracture of the thigh, and wounds on the right side, arm, fingers, and face. They were satisfied that death resulted from injuries to the internal organs. The inquiry was then adjourned until last Thursday, when, after hearing the evidence of a number of witnesses, the jury arrived at this verdict: "That deceased came to his death by wounds received by an explosion at the Coleraine Gas-Works, on the 20th of October, 1891, by the incautious lighting of a match by a fellow-workman, and that no blame could be attached to anyone."

The Proposed Purchase of the Rhyl Water-Works by the Local Authority.—A special meeting of the Rhyl Commissioners was held on the 21st ult., for the purpose of considering the advisability of promoting a Bill in Parliament for the compulsory purchase of the Rhyl Water-Works. The Chairman (Mr. W. E. Williams) stated that the most important question for the Board to consider was whether they should take the step jointly with the St. Asaph Rural Sanitary Authority and the Abergele Local Board, or go alone. In his opinion, it would be much better to act singly. After some discussion, Mr. Mostyn Williams proposed that, "Having heard the report of Mr. Deacon, C.E., on the Rhyl District Water-Works, and having suffered seriously from the want of a proper supply of water for many years, and the Water Company having failed to meet the reasonable requirements of our district, it is resolved that the Commissioners do take the necessary steps for purchasing the water-works, or promoting a Bill in Parliament in the ensuing session for compulsorily acquiring the Company's undertaking for supplying water for the Improvement Act district of Rhyl or any extension thereof, or for the Company's district, as the Commissioners may be advised, or as may be allowed by Parliament; also for obtaining such additional borrowing and rating powers as may be required for such purpose or purposes." The motion was unanimously carried. At a public meeting of ratepayers last Wednesday, a resolution was passed sanctioning the action of the Commissioners in taking steps to acquire the works. A poll was afterwards demanded.

Messrs. Richmond and Co., Limited, gas-stove manufacturers, of Warrington, have just opened offices and show-rooms at Nos. 64 and 65, Basinghall Street, E.C.

The New Gas-Works at Ystrad.—Owing to the great increase in the demand for gas, the Ystrad Gas and Water Company decided early in the year to remodel and extend their works at Ystrad. This has now been done (chiefly on land adjoining the site of the old works) from the plans and under the superintendence of the Company's General Manager, Mr. F. J. Baynes, at a cost of about £7000. The new works comprise railway sidings, a shed for unloading coal, coal-stores, retort-house, retort-bench of eight arches, with the usual adjuncts, condensers, boiler-house containing two boilers, stokers' mess-room, exhauster-house, exhauster and engine, three steam-pumps, a Livesey washer, two tower scrubbers, underground tar and liquor tanks, overhead tanks for tar, liquor, and clean water, four purifiers, each 12 feet square and 4 feet deep, commodious lime-shed, meter and governor house, &c. The contracts for the various sections of the works were placed in the hands of well-known firms; and a large proportion of the pipe-laying and miscellaneous work was done by the Company's workmen. The necessity for these extensions is shown by the following figures, giving the production and sale of gas in the periods named: In 1887, the make was 46,415,000 cubic feet; the sale, 34,863,000 cubic feet—leaving 11,552,000 feet, or 24·86 per cent., unaccounted for. In 1888, the make was 50,456,000 cubic feet; the sales 41,498,000 cubic feet—leaving 8,958,000 cubic feet, or 17·75 per cent., unaccounted for. In 1889, the make was 50,088,000 cubic feet; the sale, 43,383 cubic feet—leaving only 6,705,000 cubic feet, or 13·38 per cent., unaccounted for. Last year the make was 56,540,000 cubic feet; the sale, 48,179,000 cubic feet—leaving 8,361,000 cubic feet, or 14·78 per cent., unaccounted for. In the half year ending June 30 last the make was 29,205,000 cubic feet; the sale, 26,242,000 cubic feet; used on works, 380,000 cubic feet—leaving 2,583,000 cubic feet, or 8·84 per cent., unaccounted for. These percentages, although they show great improvement in the past four years, are still very high; but this is owing to the nature of the district, which, being a mining locality is subject to continual and serious subsidences.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 842.)

Issue.	Share	When ex-Dividend.	Dividend on Ord. Issue.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	15 Oct.	10½	Alliance & Dublin 10 p. c.	10	16—17	..	6 3 6
100,000	10	„	7½	Do. 7 p.c	10	11¼—12⅛	..	6 0 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	106—108	..	4 12 7
100,000	20	28 May	8	Bahia, Limited	20	13—15	..	10 13 4
200,000	5	13 May	7½	Bombay, Limited	5	6¾—7	—¼	5 7 1
40,000	5	„	7½	Do. New	4	4⅝—5¼	..	5 14 1
380,000	Stck.	13 Aug.	12½	Brentford Consolidated	100	215—225	..	5 8 10
125,000	„	„	9½	Do. New	100	157—162	..	5 14 2
220,000	20	16 Sept	11½	Brighton & Hove Original	20	40—42	..	5 9 6
444,250	Stck.	16 Sept.	10	Bristol	100	206—211	—2	4 14 6
320,000	20	15 Oct.	11½	British	20	44—46	..	4 17 10
50,000	10	28 Aug.	11½	Bromley, Ordinary 10 p. c.	10	18—20	..	5 15 0
50,380	10	„	8½	Do. 7 p. c.	10	13—15	..	5 13 4
328,750	10	13 Nov.	6	Buenos Ayres (New) Limited	10	6½—7½	..	—
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	92—96	..	6 5 0
150,000	20	13 Aug.	8	Cagliari, Limited	20	24—26	..	6 3 1
550,000	Stck.	15 Oct.	13⅜	Commercial, Old Stock	100	240—250	..	5 10 0
161,396	„	„	10½	Do. New do.	100	285—295	..	5 10 3
130,000	„	26 June	4½	Do. 4½ p. c. Deb. do.	100	119—124	..	3 12 7
800,000	Stck.	11 June	10	Continental Union, Limited	100	215—225	—5	4 8 10
200,000	„	„	7	Do. 7 p. c. Pref	100	190—200	..	3 10 0
75,000	Stck.	16 Sept.	10	Crystal Palace District	100	190—200	..	5 0 0
486,090	10	15 July	10	European, Limited	10	19—20	..	5 0 0
354,060	10	„	10	Do. Partly paid	7½	14—15	..	5 0 0
5,470,640	Stck.	13 Aug.	13	Gaslight & Coke, A, Ordinary	100	215—220	—2	5 18 2
100,000	„	„	4	Do. B, 4 p. c. max.	100	94—97	..	4 2 5
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	251—256	..	3 18 1
30,000	„	„	5	Do. F, 5 p. c. Prf.	100	118—123	..	4 1 4
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	172—177	..	4 4 9
1,300,000	„	„	7	Do. H, 7 p. c. max	100	155—160	..	4 7 6
463,000	„	„	10	Do. J, 10 p. c. Prf.	100	250—255	..	3 18 5
476,000	„	„	—	Do. K, 6 p. c. Prf.	100	145—155	..	3 17 5
1,061,150	„	11 June	4	Do. 4 p. c. Deb. Stk.	100	112—115	..	3 9 7
294,850	„	„	4½	Do. 4½ p. c. do.	100	120—125	..	3 12 4
908,000	„	„	6	Do. 6 p. c. do	100	163—168	..	3 11 5
3,800,000	Stck.	13 May.	12	Imperial Continental	100	218—223	—1	5 7 8
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4⅛—4⅜	..	6 6 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	109—111	..	4 10 1
541,920	20	11 June	6⅔	Monte Video, Limited	20	16—17	—⅓	7 12 11
150,000	5	28 May	10	Oriental, Limited	5	8¼—8½	..	5 14 3
60,000	5	30 Sept.	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited	10	2½—3½	..	—
420,000	100	3 Nov.	6	People's Gas of Chicago—1st Mtg. Bds.	100	90—95*	+1	6 6 4
500,000	100	1 June	16	2nd Do.	100	90—95	..	6 6 4
150,000	10	15 Oct.	10	San Paulo, Limited	10	12¾—13¼	—¼	7 8 1
500,000	Stck.	28 Aug.	15½	South Metropolitan, A Stock	100	260—270	+5	5 14 10
1,350,000	„	„	12	Do. B do.	100	220—225	+2½	5 6 8
200,000	„	„	13	Do. C do.	100	225—235	..	5 10 8
700,000	„	26 June	5	Do. 5 p. c. Deb. Stk.	100	140—145	..	3 9 0
600,000	Stck.	16 Sept.	11½	Tottenham & Edm'nton, Orig.	100	—	..	—
				WATER COMPANIES.				
729,281	Stck.	16 June	10	Chelsea, Ordinary	100	265—270	..	3 14 1
1,720,560	Stck.	15 Oct.	8	East London, Ordinary	100	204—209	..	3 16 7
544,440	„	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	138—143	..	3 3 0
700,000	50	11 June	8	Grand Junction	50	105—110	..	3 12 9
708,000	Stck.	13 Aug	10½	Kent	100	260—270	—5	3 17 9
1,043,800	100	26 June	9½	Lambeth, 10 p. c. max.	100	235—240	—1	3 19 2
406,200	100	„	7½	Do. 7½ p. c. max.	100	195—200	..	3 15 0
260,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	100	118—121	..	3 6 1
500,000	100	13 Aug.	12½	New River, New Shares	100	341—346	..	3 10 1
1,000,000	Stck.	30 July	4	Do. 4 p. c. Deb. Stk	100	123—126	..	3 3 6
902,300	Stck.	11 June	6½	S'thwk & V'xhall, 10 p. c. max.	100	160—165	..	3 18 9
126,500	100	„	6½	Do. 7½ p. c. do.	100	160—165	..	3 18 9
1,155,066	Stck.	11 June	10	West Middlesex	100	252—257	..	3 17 10

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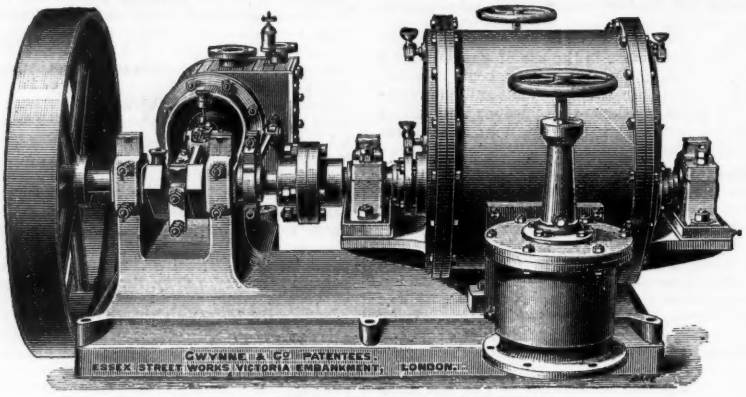

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Tenders to be sent to the Secretary of the Company, on or before the 30th of November, 1891.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of FIRE-CLAY GOODS (Retorts, Bricks, &c.) required for Repairs at their Neepsend and Effingham Street Stations during the next Twelve months.

Specifications and forms of tender may be had on application to the Company's Engineer, Mr. Fletcher W. Stevenson.

The Directors do not bind themselves to accept the lowest or any tender.

Sealed tenders, marked "Tender for Fire-Clay Goods," must be delivered by post, addressed to the undersigned, not later than Monday, the 30th inst.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
Nov. 6, 1891.

YSTRAD GAS AND WATER COMPANY.

LEAD.

THE above Company invite Tenders for the supply and delivery of about 15 tons of LEAD PIPING (chiefly ⅝ inches internal diameter, weighing 5 lbs. per yard), and about 1 ton of best PIG-LEAD for Jointing, to be delivered as required at Pentre Office, *viâ* Ystrad Goods Station, or Pandy Workshop, *viâ* Trealaw Goods Station, both on the Taff Vale Railway. The contract to expire June 30, 1892.

The Company do not bind themselves to accept the lowest or any tender.

Sealed tenders, marked "Lead," to be sent to the undersigned.

F. J. BAYNES,
General Manager.

9, Ystrad Road, Pentre,
Near Pontypridd.

TO CANNEL MERCHANTS.

GUILDFORD GASLIGHT AND COKE COMPANY.

THE Directors are prepared to receive TENDERS for 1200 tons of CANNEL, suitable for Gas Manufacturing purposes.

Tenders to state a price per ton of 20 cwt., delivered free at Guildford Railway Station (deliveries to extend to June 30 next), also to state where the Cannel is raised, and to be endorsed "Tender for Cannel," and delivered to the Chairman of the Gas Company, Guildford, on or before Nov. 19 inst.

By order,
WILLIAM LONGWORTH,
Secretary.

Gas Offices, Guildford,
Nov. 7, 1891.

DUNDEE WATER-WORKS.

LINTRATHEN SUPPLY.

CONTRACT No. 1.

THE Dundee Water Commissioners are prepared to receive TENDERS for 4100 tons, or thereby, of CAST-IRON PIPES and SPECIAL CASTINGS, 24 inches and 27 inches diameter.

ALSO

CONTRACT No. 2.

For the EXCAVATION and other WORKS necessary in CARTING, LAYING, and JOINTING 7 miles, or thereby, of PIPES, 24 inches and 27 inches diameter.

Specifications, Schedules of Quantities, and Drawings may be obtained on and after Wednesday, the 18th current, on application to the Subscriber on payment of the sum of Two Guineas for each Contract, which sum will be returned on receipt of a *bonâ fide* tender, with prices filled in as required.

Sealed offers, endorsed "Tender for Contract No. 1" or "No. 2," as the case may be, to be delivered at the Subscriber's Office not later than Noon on Tuesday, the 1st of December, 1891.

The Engineer will meet intending Contractors at Auchterhouse Station on Wednesday, the 18th current, at One p.m. to show them over the line of intended Works.

The Commissioners do not bind themselves to accept the lowest or any offer.

GEORGE BAXTER, Engineer.

Dundee Water Commissioners' Engineer's Office,
7, Euclid Street, Nov. 10, 1891.

By order of the Directors of the Romford Gas Company, the Executors of R. O. Maugham, Esq., deceased and others. Sale of Shares and Stock in the following well-established Undertakings:—

Romford Gas Company.
West Ham Gas Company.
Crystal Palace District Gas Company.
West Kent Gas Company.
Law Life Assurance Society (55 shares).

MR. ALFRED RICHARDS will sell the above BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, Nov. 16, at Two o'clock punctually in lots.

Particulars of the SECRETARY of the Romford Gas Company, South Street, ROMFORD; of Messrs. DIXON, WELD, and DIXONS, Solicitors, 10, Bedford Row, W.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE TOWN OF GEFLE, SWEDEN.

THE Authorities of the above Town are desirous of receiving TENDERS for the erection of a SINGLE-LIFT GASHOLDER at their new Works. The Holder to contain about 80,000 cubic feet, and to be ready for use by the 15th of August, 1892.

Estimates, with enclosed drawings, for the above Holder, with Pipes and Valves complete, are to be sent in, to Gefle Stads Byggnadskontor, at the latest by the 20th prox.

By order of the FINANCIAL DEPARTMENT.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
INCORPORATED BY ACT OF PARLIAMENT.

NOTICE is hereby given, that the Half-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, the 3rd inst.

Sir JULIAN GOLDSMID, Bart., M.P., in the chair, when the following Resolutions were unanimously passed:—

That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes.

That a Dividend of 5 per cent. for the Half Year ended the 30th of June last, and a Bonus of 1 per cent. be declared upon the £3,800,000 Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 1st of December next.

That the cordial thanks of the meeting be given to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the chair this day, to Mr. H. V. Lindon, Mr. L. G. Drory, the Agents, Engineers, and other Officers of the Association on the Continent, and to the Secretary and the London Staff.

By order of the Board,
R. S. GARDINER,
Secretary.

30, Clement's Lane, Lombard Street,
London, E.C., Nov. 4, 1891.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

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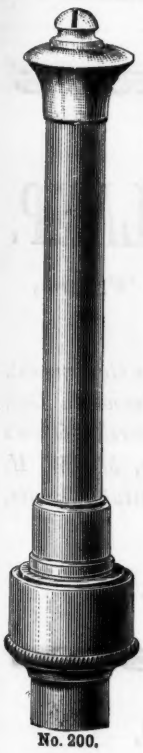

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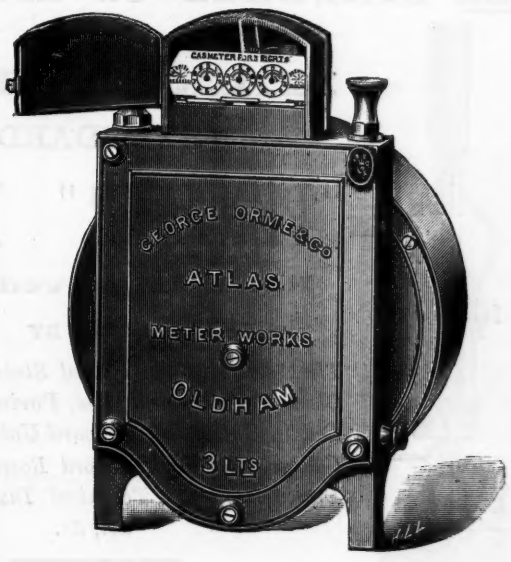

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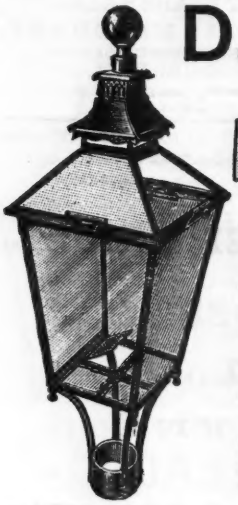

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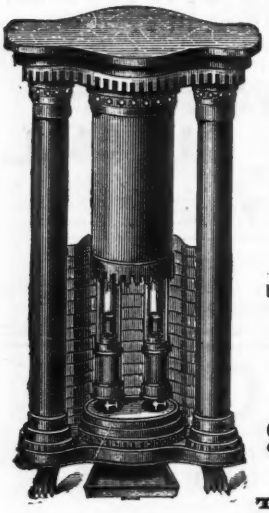

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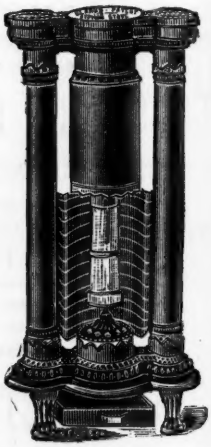

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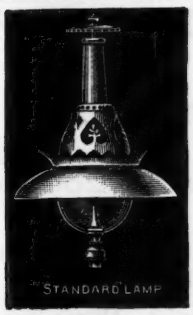

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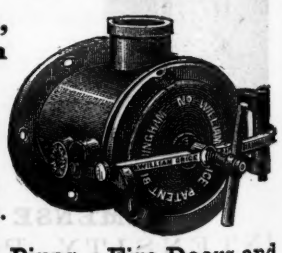

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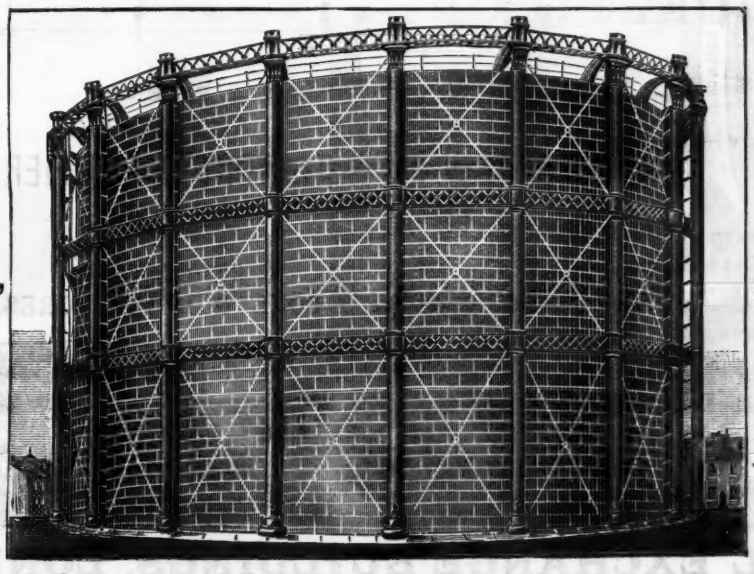

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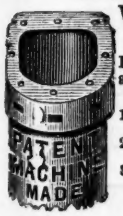

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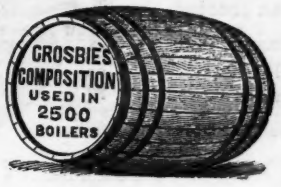

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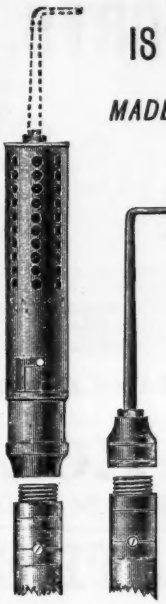

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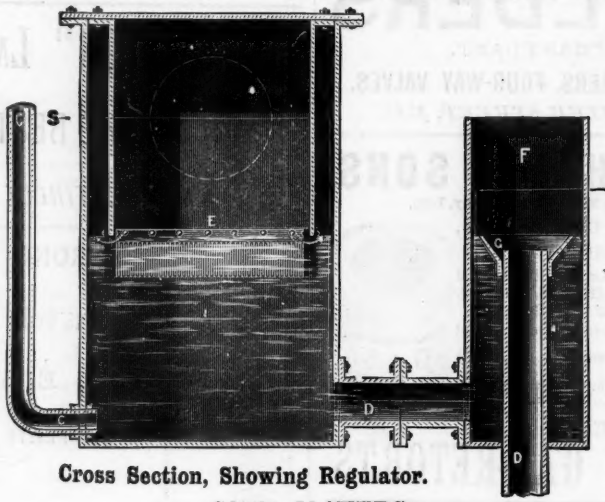
No more Gas spoilt by over-running the Exhauster.

Perfectly Self-acting.

Particulars and prices on application.



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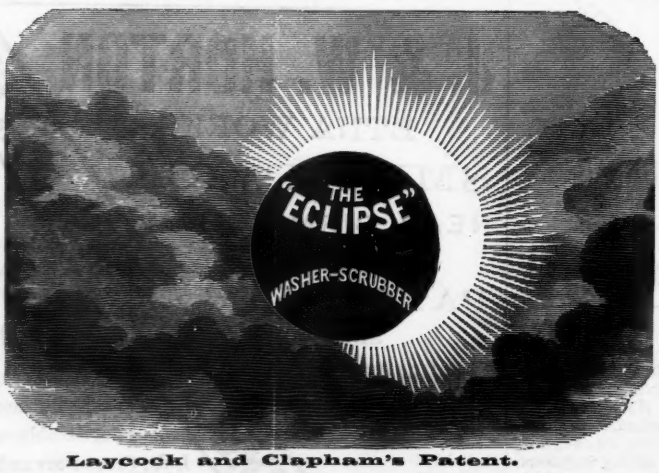

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The most efficient Machine known for extracting Ammonia and other Impurities from Coal Gas.

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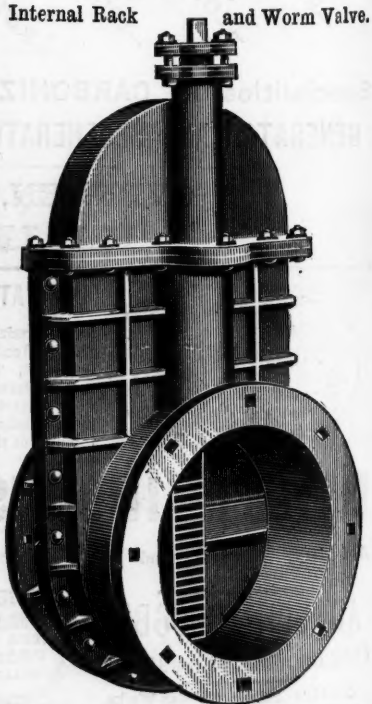

SILVER MEDAL, Inventions Exhibition, 1885.

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